THE PRACTITIONER

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THE MONTH

THE opening of a new year gives the Editors an opportunity of greeting their readers, of reviewing the past twelve months and discussing the future. On this occasion the beginning of the year is also the beginning of a new half-century. During these fifty years medicine and surgery have been made exact sciences, or rather arts turning increasingly to science for guidance and help and making exactitude their aim both in diagnosis and treatment. Exact diagnosis has been made possible by the whole range of electrical and electro-optical instruments that have appeared, by X-rays progressively extended by the use of contrast media to the investigation of every organ and system, by scopes and specula for every orifice and channel, by recorders of action currents like the electrocardiograph and the encephalograph, by the advance of bacteriology and the introduction of specific tests for many bacterial infections, by the ability of the biochemist to test the functional efficiency of any system. Pathological research has sorted out the menagerie group of disease with which the nineteenth century had to deal into a number of specific entities, calling for exact identification and requiring a known form of therapy. Treatment became for the first time a science when Ehrlich discovered Salvarsan in 1909. Since then selection of drugs for their specific action on some part of the body or on some particular organism has become so much an established practice that the cough mixtures, the tonics, the diaphoretics, the alteratives, with which we treated our patients only a few years ago are tending to stand to-day on our shelves as survivals of a vanishing age.

The Changing Face of Medicine

IT is appropriate that so far as *The Practitioner* is concerned the outstanding event during the past year was the publication in September of an extra number reviewing the first year's working of the National Health Service Act. We undertook this task with considerable misgivings, knowing well the difficulty of distinguishing after so short a trial between the faults of the Act and the early problems of its administration, between the benefits of the Act and the determination of a profession with great traditions to serve their patients in spite of the papyrorrhœa of officialdom. We realized too, the difficulty of finding writers who could speak with knowledge yet without bias, who could speak frankly, without prancing a red or blue hobby horse across our pages, yet without the circumlocutory verbosity of the journalistic Jehovah who wishes to please

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all and offend none. That we succeeded has been shown by the universal approval with which this number has been received, even by those who are whole-hearted supporters of the new Service. The good was freely acknowledged, the bad was exposed, with clear evidence in support of the criticisms expressed, and with suggestions for improvement. Many of the difficulties brought to light, particularly in the articles by the obstetrician and the dental surgeon, will undoubtedly demand attention during the coming year.

The Practitioner 1950

So many of our readers have written expressing their approval of *The Practitioner* in its present form, that we do not contemplate any but minor changes in the arrangement of the journal. The monthly symposium will as heretofore be the leading feature. Revision Corner and Current Therapeutics have proved so useful, and the excerpts from *The Practitioner* of fifty years ago so popular, that we propose to continue them during the coming year. The section on Notes and Preparations has been hampered by the disproportion between the material available and the space at our disposal, and we propose to print this section, which is above all of contemporary interest, in an enlarged form in the end pages.

The one new feature is "The Month". This is a revival of a feature which first appeared in our pages in 1895, and was continued until 1902, when Sir Malcolm Morris relinquished his editorship. We cannot hope to imitate the eloquence of the great Victorians, nor do we propose to follow their frankness, for people to-day have much thinner skins than their fathers, but we hope to make "The Month" a forum in which we can discuss current events, medical and medico-legal politics, recent legislation, new drugs, features in contemporary journals, indeed anything that comes into our minds.

The Press and Medicine

THE interest of the modern lay press in medical matters is not without its dangers. Whether health-consciousness is a healthy state of affairs may be arguable, but there can be no doubt that the recent dramatic advances in therapy, such as penicillin and compound E, to mention only two, have stimulated the demand of the public for news of medical affairs. Unfortunately, there would appear to be few newspapers in this country which have the ability to present medical news to their readers in a way that is both interesting and reasonably accurate. Headlines have become an essential constituent of newspapers, but it is regrettable that more care is not exercised in correlating their size with the importance of the subject being discussed. In this respect our American friends are well in advance of us. The medical items in the *New York Times* and *Time*, for instance, are almost models of how such matters can be reported accurately, yet in terms which the average layman has little difficulty in understanding. Indeed, an eminent scientist of our acquaintance swears by one of the

papers which we have just mentioned as his most reliable guide to the latest advances in medicine. Be this as it may, there can be little doubt that these reports are of a commendably high standard of accuracy. Is it too much to hope that the British press will try to emulate their American colleagues in this respect?

Our interest in this matter is not entirely altruistic. As a clearing-house of information for our readers we are receiving an increasing number of requests from practitioners for information concerning recent advances in therapeutics of which they, or their patients, have read in the press. We fully sympathize with the practitioner who is asked by a patient to prescribe the treatment recommended that morning in the *Daily Grumble*, and we propose, so far as we can, to discuss in these pages such items of popular interest and to inform our readers concerning their availability. To do this adequately would be a herculean task involving the utilization of much more space than can be spared these days. Hence, our reason for an appeal to our fellow editors in Fleet Street to wield the blue pencil (or scissors) more freely, or alternatively to try and ensure a better medical news service. So far as our readers are concerned, we would ask them not to hesitate to write to us for information on all such matters.

The Doctor's Responsibility

It is particularly appropriate in the first number of a half-century that we should be able to publish Professor Platt's stimulating article on "The Doctor's Responsibility". The rapid advances of recent years in both diagnosis and therapeutics have made the practitioner's task an increasingly onerous and responsible one, and there is little doubt that the medical curriculum has not kept pace with them. The old problem of correlating the art and the science of medicine has been complicated by the equally complex problem of attempting a synthesis of the educational and technical aspects of the training of medical students. No one appreciates the problem better than the intelligent senior medical student as he approaches his final examinations and realizes that as an undergraduate he has achieved neither the cultural background of his colleagues in the faculty of arts nor the technical knowledge of his contemporaries in technical colleges. Whatever the final solution may be, an immediate step in the right direction would be taken by following Professor Platt's advice concerning University health centres. An alternative suggestion, and in some ways a better one, is the re-introduction of dispensary practice as has been done in Edinburgh under the stimulation of Professor Crewe. Those of us who participated in this practice in the old days have always been aware of the practical benefit we derived from actually dealing with patients in their own homes, and so gaining first-hand experience of the type of work which lay ahead of us on qualifying.

The distressing uniformity with which subscriptions to medical societies

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Increased Society Subscriptions

are increasing makes sad reading for the practitioner, especially when it coincides with the Minister of Health's categorical denial of any increase in remuneration for general practitioners. The Defence Unions and the British Medical Association were early in the field, the former doubling their annual subscriptions and the latter increasing it to four guineas. Now comes the Royal Society of Medicine with a proposal that the annual subscription for fellows should be raised to seven guineas for those living in the London postal area and six guineas for those living outside this area. At the time of going to press the special meeting convened to discuss this project has not met but, whatever the decision, there can be little doubt that such an increase would cause hardship to many and might unfortunately result in some resignations. Rising costs are an altogether too unpleasant reality these days, but it is incumbent upon officials and office-bearers of medical societies to realize that their members are of that section of the community which is most seriously hit by rising costs and increasing taxation. It therefore behoves them to exercise the strictest economy in administration. Grandiloquent schemes of expansion always appeal (and naturally so) to officials of societies, but these are not the days for such expansion in this particular sphere. If members have to trim their sails to meet the new squall of financial stringency they are now encountering, then it is incumbent upon medical societies to do everything they can to avoid adding to practitioners' financial difficulties.

Centenaries of 1950

THE advent of a new year and of a new half-century brings in its train the usual host of centenaries. Once again we are asked to resurrect men whose names have in perpetuity become enshrined or merely imprisoned in an anatomic structure, an operation, or an instrument. At the same time the curiosity of this age is tempted to comment upon the ashes of "truants" from medicine who have achieved renown or notoriety in other walks of life. Every medical man is familiar with Unna's paste (Paul Gerson Unna, b. Sep. 8, 1850), Clutton's joints (Henry Hugh Clutton, b. July 12, 1850), Grawitz's tumour (Paul Grawitz, b. Oct. 1, 1850), Mikulicz-Radecki's disease (Johann von Mikulicz-Radecki, b. May 16, 1850). Worthy of commemoration are William Prout, pioneer in physiological chemistry, discoverer of hydrochloric acid in the stomach (d. April 5, 1850), and William Henry Welch, pathologist and historian (b. April 8, 1850). Those who remember that both the great Sir James Paget and his pupil William Palmer, the poisoner, are immortalized in the Dictionary of National Biography, may like to think back this year on three medical men who played truant and died on the gallows: Thomas Neill Cream and George Henry Lamson (b. 1850), and Professor John White Webster (d. Aug. 30, 1850).

THE PREMATURE INFANT

By RICHARD W. B. ELLIS, M.D., F.R.C.P.

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By international convention, an infant is described as premature if the birth weight is 5½ lb. (2,500 g.) or less. This assessment of maturity by birth weight is admittedly crude and arbitrary, since infants of diabetic mothers may weigh considerably more than 5½ lb. and yet be premature, whilst infants weighing between 5 and 5½ lb. will sometimes appear mature in every other respect. For practical purposes, however, an infant weighing less than 5½ lb. will usually require special care. Infants of less than 28 weeks' gestation are generally considered non-viable, and the mortality rate of infants weighing less than 2¾ lb. (1,250 g.) at birth is high. However, every effort should be made to secure the survival of a live-born infant, regardless of the estimated period of gestation or the birth weight; sufficient numbers of infants weighing less than 1000 g. at birth have survived and developed satisfactorily to show that the diagnosis of "non-viability" should never be incautiously applied.

The incidence of premature birth has been variously estimated, e.g. 10 per cent. of all live births in Scotland (McNeil, 1942), 6.3 per cent. in Birmingham in 1944 (Crosse, 1946); but all figures emphasize that prematurity is of common occurrence and is a most important contributory factor to infant mortality (Drillien, 1947; Dunham, 1948). Prevention of premature birth is primarily one of antenatal care. In nearly 50 per cent. of cases no clearly recognizable cause can be found, and in the remainder, toxæmia and twin pregnancy are the two most important factors, followed by antepartum hæmorrhage, placenta prævia, fœtal deformity, and various maternal conditions (cardiac and respiratory disease, pyelitis, syphilis). Premature birth is usually found to occur more often in first and second births than in later pregnancies, whilst the relationship to the general physique and nutrition of the mother has repeatedly been emphasized. It is significant that the incidence of prematurity is higher in the lower income groups and in illegitimate infants than among the well-to-do.

In many instances it is necessary to weigh carefully the infant's chances of survival if the pregnancy is terminated prematurely, and against the risk of stillbirth or maternal damage if the pregnancy is allowed to go to term. In such cases it will be remembered that the prospects of survival are negligible before the 28th week of gestation, and that after the 36th week, the infant's prospects are reasonably good. Recently, the question has arisen as to the advisability of terminating pregnancy prematurely when a Rhesus-negative mother has had previous infants with hæmolytic disease of the newborn,

and when there is strong reason to believe that the fœtus will be affected (e.g., when maternal antibodies are present, and when the father is Rhesus positive and homozygous). It is too early to say whether or not a significant number of infants can be saved by this means, and whilst there is evidence that in some cases the fœtus dies *in utero* between the 36th and 40th week, it is not equally certain that these infants could be saved if delivered prematurely.

PHYSICAL STATUS

The premature infant is not only below the normal birth weight, but is shorter than the full-term baby. Barcroft (1947) has emphasized that whilst animal fœtuses of similar maturity may be "plump or lean", they differ considerably less in crown-rump length than they do in weight. The crown-rump length is probably the most reliable single measurement in estimating maturity of the human fœtus also, although it is not in general clinical use. It is estimated as 23 cm. at 28 weeks, 26.5 cm. at 32 weeks, and 33.5 cm. at 40 weeks, i.e. full-term (Hamilton *et al.*, 1945). Other stigmata of prematurity are more variable. The head and abdomen appear relatively large in comparison with the limbs, and since the growth of the brain is disproportionately rapid after birth, the shape and size of the head and the separation of the sutures may give rise to a mistaken diagnosis of hydrocephalus. The lack of subcutaneous fat often gives the infant a wrinkled and senile appearance, although this is less obvious in infants of more than 35 weeks' gestation. The more immature infants often show the presence of lanugo covering the body, whilst the skin may be dull red in colour, becoming paler after the 32nd week. Failure of the nails to cover the nail-beds is an inconstant finding. The cry is high-pitched and relatively feeble. Respiration is commonly irregular, and periods of Cheyne-Stokes' breathing may be interrupted by gasps or periods of apnœa. Cyanotic attacks indicate a complicating factor or extreme immaturity of the respiratory centre. The reflexes may differ from those of the full-term infant; thus the Moro embrace reflex is often minimal or absent, whilst the grasp reflex may be extremely well developed. Sucking and swallowing are considered on p. 11.

Neonatal jaundice is often more marked and more prolonged in the premature than in the full-term infant, due principally to the greater immaturity of the liver. The hæmoglobin also falls to a lower level, and the infant develops some degree of anæmia which is commonly progressive to the second or third month and then tends to recover spontaneously. This *anæmia of prematurity* is not altogether avoidable, although it can be reduced in severity and duration by the administration of iron (*see* p. 10). The routine transfusion of small premature infants is not now recommended, although transfusion may be necessary in exceptional cases.

CARE OF THE PREMATURE INFANT

This should start before birth whenever possible, since not only must pre-

paration for the reception of the infant be made before delivery, but the prospects of survival will be affected by the type of delivery.

It is generally considered advisable to give an injection of vitamin K to the mother before delivery when premature labour is expected, and to the infant after birth, as a routine, although the evidence that vitamin K before delivery has caused a significant reduction in the incidence of neonatal hæmorrhage is not convincing.

At the time of birth, the infant must be received immediately into a warmed blanket and transferred to a warmed cot or premature nursery. The type of clothing used will depend upon the facilities for temperature-regulation available. When the temperature of the environment cannot be well controlled, the baby should wear a double layer of gamgee tissue, a long gown which can be tucked under the feet, and woollen cap, gloves and socks, and should be wrapped in blankets.

Any inhaled liquor should be allowed to drain from the mouth. The discriminating use of a mucus extractor may be a life-saving procedure, but this instrument can be a very real danger and source of infection if improperly handled. It should be fitted with trap, mouthpiece, and soft rubber catheter, and must be sterilized before use. If it becomes blocked, a second should be available. (The practice of blowing through a blocked mucus extractor is inexcusable.)

Activity of the premature infant is less than that of the infant born at term, and the baby sleeps almost continuously between feeds. Nursing should aim at a minimum of disturbance and handling, although regular changes of position are generally advisable. It has, however, been found that when premature infants have been nursed in a thermostatically controlled environment with a minimum of clothing (Wallace, 1947), spontaneous movement is greater than when the infant is heavily clothed, and that this movement is possibly beneficial.

Temperature.—Temperature regulation is unstable. It is therefore essential to secure an even temperature of the immediate environment; whilst chilling is the principal danger, overheating may easily occur. A rectal temperature of 97° to 98° F. (36.1° to 36.7° C.) should probably be considered "normal" for the premature baby.

The best means of securing an optimal temperature and humidity of the environment must be carefully considered in each individual case and, if possible, preparations should be made before delivery. In large maternity units it is often found an advantage to have thermostatically controlled premature nurseries in which the humidity is also centrally controlled, and a piped supply of oxygen is available. It must be emphasized, however, that whilst such units have advantages in nursing and lessen the risk of chilling while the infant is being weighed, the toilet attended to, or any therapeutic procedures carried out, they are worse than useless if the central plant is unreliable. It is also essential to have separate accommodation for sick premature infants, and it is generally inadvisable to admit premature

infants from the district into the same nursery as that reserved for "clean" cases delivered in hospital. A further complication is that the smallest premature infants require a higher environmental temperature than the more mature. Thus infants weighing less than 3½ lb. (1,590 g.) require a temperature of approximately 85° F. (29.4° C.), whilst larger infants usually thrive better at a temperature of 75°F. (23.9° C.). The humidity should be kept between 60 and 70 per cent. When transfer of a premature infant from the home to a central unit is undertaken, the greatest care is necessary to avoid chilling *en route*. In some areas a premature infant ambulance service has been arranged.

As an alternative to thermostatically controlled premature nurseries, the various types of premature incubator now on the market give excellent results. A type which will serve as a combined incubator and oxygen tent is usually preferred. It is still necessary, however, that the room temperature should be kept as far as possible stable, and chilling avoided during feeding or nursing care.

CARE IN THE HOME

Since it is neither necessary nor possible for all premature babies to be cared for in hospital, arrangements will often have to be made in the home. If it is not practicable to use an incubator, the infant should if possible be isolated from all except the immediate attendants. A separate small room which can be kept warm, and where humidity can be raised by various means, e.g. hanging a damp sheet over a radiator or before the fire, or the use of a steam-kettle, should if possible be set aside for the infant, but excellent results can often be obtained with skilled nursing, at least in the case of larger premature infants, when the home circumstances are far from ideal (Miller, 1947). In an open room, the cot should be protected from draughts and screened. When cot warming with hot-water bottles is necessary, the bottles should be so arranged that they can be changed without disturbing the infant, and care must be taken to avoid overheating. A cot temperature of 90° to 95° F. (32.2° to 35° C.) is satisfactory for the smallest infants (Crosse, 1945), but can be lower for the more mature.

With regard to the type of cot selected, the main considerations are that the cot should be of suitable size and impervious to draughts; it should be possible to sterilize both cot and bedding. A large papier-mâché bowl has been found quite satisfactory for small premature babies when the room temperature can be kept high, but the most varied improvisations have been successfully used, e.g., a wooden box with false bottom, under which hot-water bottles (or, failing these, hot bricks) can be inserted.

GENERAL NURSING CARE

Since the survival of small premature infants depends to a considerable extent upon the nursing care they receive, it is a great advantage if the services of a nurse with previous experience of premature nursing can be

obtained. The smallest infants will require attention at frequent intervals throughout the twenty-four hours. The general principles of premature nursing involve a minimum of disturbance of the infant; prevention of infection; attention to the temperature; the prompt recognition of warning symptoms, e.g. colour changes; care of the skin; and discrimination in the technique of feeding, e.g. avoidance of exhaustion during feeding or the inhalation of vomitus.

Masks should be worn by attendants, and the usual precautions taken to prevent these from becoming saturated. A clean gown should be worn when the infant is handled or fed. Visitors must be excluded. Scrupulous attention to the cleanliness of feeding utensils, thermometers, attendant's hands, and the like, is even more important in the case of the premature than in that of the full-term infant.

Since regular weighing is essential in assessment of progress, an accurate scale should be available. Both the character and number of the stools should be charted, the former being of prime importance, since alterations in colour and consistency of the fæces are of more significance than the actual number of times that stools are passed. The premature infant should not be bathed, oiling and powdering being sufficient until the infant has reached a weight of 5 lb. (2,270 g.) or more.

Oxygen.—This should always be available, and nursing in continuous oxygen is advisable if the infant shows colour changes, prolonged periods of apnœa, or the gasping type of respiration. Indeed, there is much to be said for its routine use in the case of infants under 3 lb. (1,360 g.) in weight. If one of the more elaborate infant oxygen tents is not available, a satisfactory type can be improvised from X-ray films joined by adhesive to form a box fitting over the infant's head, with an apron of polythene sheeting attached at the base and tucked under the bed clothes. The oxygen tube is run in through a hole in the top of the tent. The administration of 5 per cent. CO_2 in oxygen is sometimes useful for a few minutes hourly when there is atelectasis.

FEEDING

The ideal method of feeding premature infants is still a matter of controversy. Comparative figures are given by Ford (1949).

Composition of feed.—The fact that the smaller premature infant may develop hypoproteinæmia if fed on breast milk alone, or fail to gain weight as rapidly as those fed on artificial cow's milk formulæ, has been used as an argument in some clinics against *breast-milk feeding*. In my opinion this is quite unjustified. Whenever breast milk can be obtained it should be used; this is usually possible in a large maternity clinic or where a breast-milk bank has been established, even if the mother is unable to provide sufficient by expression. In the case of infants weighing less than $4\frac{1}{2}$ lb. (2,040 g.) the milk should be fortified by the addition of a protein preparation, e.g. casein hydrolysate, to bring the infant's protein intake up to 5 g.

per kg. body weight per day. With larger infants, every effort should be made to maintain the mother's lactation, putting the infant to the breast as soon as it can suck vigorously, and holding the nipple in the mouth.

When *artificial feeding* has to be adopted, a half-cream dried milk or evaporated milk formula should be used in place of breast milk. If a dried milk formula is used, that recommended by Gordon (1947) has the advantage of providing a feed that is high in protein and carbohydrate and low in fat, and is usually well tolerated by the smaller infant. It consists of 18 g. half-cream dried milk powder, 11 g. carbohydrate, with 150 ml. water, and contains 0.8 calories per ml. (22.7 calories per fluid oz.). There are, however, some advantages in using an unsweetened evaporated milk, one part of milk being mixed with two parts of water, with 1 g. of lactose added to each fluid oz. (30 ml.) of the mixture (Ford, 1949). This formula may also be fortified with casein hydrolysate. Proprietary brands of sweetened condensed milk are unsuitable for prolonged use.

Supplements.—Vitamin supplements must be started earlier than in the case of full-term infants, and the amount of vitamin D necessary to protect against rickets is greater. From the third week, infants should receive a concentrate containing a minimum of 3000 units of vitamin D, 20,000 units of vitamin A, and 25 to 50 mg. of ascorbic acid daily. Vitamin B complex is often recommended also, although the infant's requirements are less certainly known. Vitamin K, 1 to 2 mg., is given immediately after birth. Supplements of calcium, phosphorus and iron are also required, the former being given as syrup of calcium lactophosphate after the second week, and iron from the fifth week onward, starting with small doses to avoid digestive upset.

Size of feeds and caloric intake.—These will have to depend upon the infant's tolerance, and it is the greatest mistake to sacrifice the baby to preconceived ideas about his theoretical requirements. If the baby has maintained or regained his birth weight by the age of fourteen to twenty-one days, it may be expected that subsequent weight gain will be steady if a suitable feed is given in increasing amounts, keeping pace with the infant's ability to retain and digest it. A regime which has been found satisfactory has been to give nothing by mouth for the first twelve hours, and only lactose or glucose water three-hourly during the second twelve hours. On the second day, equal parts of breast milk and physiological saline are given three-hourly, and subsequently the proportion of breast milk (or dried or evaporated milk formula) is gradually increased until the infant is taking whole breast milk on the fourth or fifth day. Fortification of breast milk with added protein may be started at the end of the first week. In the case of premature infants weighing over 4 lb. (1,820 g.) the stage of whole breast milk can be reached earlier. Vomiting or looseness of the stools are indications that the food has been increased too rapidly; the infant must also be watched carefully for any signs of dehydration, indicating inadequate fluid intake. Feeding more frequently than three-hourly is only necessary or

desirable in exceptional cases; tube-feeding should be adopted when there is difficulty in giving the feeds by mouth, and in any case when mouth-feeding proves excessively slow and exhausting to the infant. The infant is likely to start gaining weight when he can tolerate 2½ oz. of breast milk per lb. (156 ml. per kg.) body weight (e.g. approximately 1 fluid oz. [28.5 ml.] three-hourly in the case of a 3 lb. [1,360 g.] baby); this tolerance is usually, but not invariably, reached by the third week, whilst in some cases it will be found that either larger or smaller amounts are required to initiate steady weight gain. The administration of fluids between feeds is undesirable unless there is evidence of dehydration.

Technique of feeding.—For practical purposes, premature infants may be divided into those who can both suck and swallow readily; those who can swallow but are unable or unwilling to suck; and those (the most immature) who make no attempt to suck, and by whom swallowing is effected with difficulty. The first group can usually be fed from a bottle fitted with a teat of appropriate size, and unless bottle feeding is so slow a process that the infant becomes exhausted, tube feeding is unnecessary. The second group can be fed by a Belcroy feeder, pipette, or tube, depending upon circumstances; whilst the third group must be tube-fed. Tube feeding has the advantage in the case of small and feeble infants that it is less exhausting than feeding by bottle or pipette and reduces the amount of disturbance. The technique of passing a soft rubber catheter into the stomach, and delivering the feed through a funnel, is readily acquired, and if great care is taken to avoid trauma, too rapid delivery, or the introduction of air with the feed, it can be recommended in appropriate cases. In infants with oral thrush, however, there is a serious risk of infection of the œsophagus and stomach.

COMPLICATIONS OF PREMATURITY

The pathological conditions which may complicate prematurity differ in degree rather than in kind from those liable to affect the newborn generally. They are largely dependent upon the immaturity of all systems. Thus, *asphyxia* (anoxia) occurs more readily and is a more serious risk to the premature infant, owing partly to the relative inefficiency of the respiratory centre. Similarly, *hæmorrhage*, either intracranial or occurring elsewhere, is related to the immaturity of the vascular system (among other factors), and brain damage often follows what has apparently been an easy delivery. *Inhalation of food* or *gastric contents* is more likely to occur in premature than in full-term infants and often gives rise to asphyxia or pneumonia (Macgregor and Rhaney, 1948). The inhalation of liquor, also, is of more serious consequence, since a vernix membrane in the lungs is observed at necropsy much more frequently in premature than in full-term infants.

Infections of all kinds are a greater risk to the premature infant, and *thrush* is particularly liable to affect small feeble infants with a low resistance, and to extend beyond the oral cavity.

Both *dehydration* and *acidosis* occur more readily in premature than in

full-term infants, arising either from excessive fluid loss in the stools or insufficient fluid intake. Correction is undertaken as for full-term infants.

Œdema of the extremities is not uncommon, and is probably related to a number of factors, e.g. deficient renal function, greater permeability of the capillaries, and hypoproteinæmia. It may be precipitated by chilling.

Retrolental fibroplasia (the formation of an opaque membrane behind the lens) has been reported in America in premature infants weighing less than 1,500 g. at birth (Terry, 1948), but does not appear to be at all frequent in this country.

Congenital malformations are considerably more common in premature than in full-term infants, and the infant should be carefully examined to exclude their presence. It is probable that in many cases it is the congenital malformation which is responsible for the infant failing to go to term.

PROGNOSIS

In the absence of gross congenital malformation or hæmorrhage, the immediate prognosis depends to a great extent upon the birth weight (*see* p. 5). Although there is a somewhat higher incidence of mental deficiency amongst prematurely born children than in those born at term, it is not by any means certain that prematurity *per se* is responsible for mental retardation, particularly if the age of the child is reckoned from term rather than from date of birth. In many instances, premature infants lag behind their contemporaries in physical development for two to five years and subsequently regain the lost ground. If large groups of children are studied, however, there does appear to be a relationship between the birth weight and the mean height and weight throughout childhood (Illingworth *et al.*, 1949), suggesting that prematurely born children are on the whole likely to be smaller than those born at term. Drillien (1948) has pointed out that this may be due partly to the same adverse conditions which resulted in prematurity continuing to act in childhood.

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THE GENERAL MANAGEMENT OF THE NEWBORN

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THERE has been a most gratifying reduction in the infant mortality rate in this country during the past thirty years, but the corresponding reduction during the neonatal period has been much less. Some 20,000 babies still die each year before they are a month old; if we add the approximately equal number of stillbirths we get a figure greater than the loss of life during the whole of the next twenty years. Many of these deaths are, of course, due to intra-uterine causes beyond the reach of present knowledge, and many aspects of the physiology and pathology of the newborn are as yet obscure, but much could still be done to save these lives by a better application of existing knowledge.

An idea of the relative importance of the different causes of death during the first month may be obtained from the figures published annually by the Registrar-General. These show that nearly half are attributed to prematurity, about a sixth to congenital abnormalities, and about one in every ten to birth trauma, atelectasis and respiratory infection, respectively. The detailed measures required for the prevention and treatment of some of these conditions are dealt with elsewhere in this issue. The purpose of this article is to draw attention to the more general principles and minor problems which form a background to the whole picture.

DOMICILIARY CONFINEMENT

One of the most important circumstances attending the birth of a child is the place in which it occurs. In 1946 less than half of the babies born in this country were delivered at home (Report of Royal College of Obstetricians and Gynæcologists, 1948), and there is reason to believe that an increasing proportion of mothers will demand to be admitted to hospitals for their confinements, if present trends continue. The mother's choice in this matter can, of course, be greatly influenced by the advice and attitude of her doctor, and although the decision in each case must be an individual one, certain general effects of the present trends cannot be ignored. There is already a shortage of maternity hospital beds, relative to the demand, in most areas; an increase in the demand cannot be adequately met without new buildings. Merely to accommodate more mothers by shortening their stay increases the risk of infection in both mother and baby, lowers the standard of individual care generally, and puts such a burden on the shoulders of the

nurses in training as to produce an adverse effect on recruiting to the profession. The alternative is to concentrate on developing the domiciliary midwifery services. This was the solution adopted in Holland before the war: 80 per cent. of deliveries took place in the home and the infant mortality rate was amongst the lowest in Western Europe.

The results which can be achieved by such a policy, even in the overcrowded conditions of Newcastle-upon-Tyne, are well illustrated by Miller's (1947-48) experience with the care of premature babies born and nursed at home. The methods used consist essentially in providing suitably trained midwives and elementary equipment (draught-proof cots and bedding, hot-water bottles, Belcroy feeder, thermometer). No technical refinement which requires continuous skilled supervision is used. Yet the results with the larger babies, as judged by survival, compare very favourably with those obtained in special premature units to which babies born at home are transferred. Only in the case of the smallest babies, weighing less than $3\frac{1}{2}$ lb. (1,590 g.) at birth, are the results of hospital care distinctly better. And this difficulty, too, may well be solved most satisfactorily by providing better facilities for home nursing. Miller also emphasizes from his own experience, that being able to share in the rearing of these babies produces an important beneficial effect on the morale of the families concerned.

Wherever the confinement is to take place, all agree that adequate help with household duties during the last weeks of her pregnancy and the whole of the puerperium is essential for the mother's physical health and mental comfort, and so for the welfare of her child. The Report previously referred to (1948) shows that only about half the mothers in this country received such help in 1946. Relatives were by far the most important source, and in only 1.5 per cent. of cases was it supplied by a Municipal service. Even allowing for the casual help supplied in a spirit of neighbourliness, much remains to be done, and it is cheering to find that certain local authorities are showing their awareness of the need in practical form.

THE PROBLEMS OF FEEDING

On the question of the baby's feeding the attitude and practice of family doctors appear to vary greatly. Conclusive evidence of the advantage of breast feeding is difficult to obtain. But it is fair to say that every piece of relevant evidence which has so far been collected is consistent with the view that the mere fact of being fed at the breast does protect the infant from some of the risks of illness and death encountered in the first year, particularly those associated with gastro-intestinal infections. The more intangible emotional factors involved are even more difficult to assess, but are probably at least as important. But there can be no doubt about what is happening in practice. The falling off in breast feeding, which began some thirty years ago when dried milks first became freely available, continues. The present situation over the whole country is that only about 45 per cent.

of mothers are wholly breast feeding at two months (Report of Royal College of Obstetricians and Gynæcologists, 1948). With more accurate methods of assessment and a comprehensive survey in a small industrial town Hughes (1948) found only 29 per cent. of Newbiggin mothers wholly breast feeding at three months.

BREAST FEEDING

Before deciding on one's attitude towards this situation, which many feel spells actual danger to an increasing proportion of our infant population, it is necessary to know whether it can be altered, and if so, how. That the situation may in fact be materially affected by the attitude and skill of those responsible for helping the mothers has been well shown for hospital practice by Waller (1943-47). Of 100 mothers specially trained and supervised by him and his staff, nearly 90 were still wholly breast feeding at three months, and over 80 still at six months. In domiciliary practice the contact with the mother and her relatives is more personal and the opportunities are correspondingly greater. It is quite clear, however, that we can hope to produce improvements in this direction only if the management of those difficulties commonly encountered during lactation is understood.

The first step is to appreciate the nature of these difficulties and the frequency with which they occur. Lactation can no longer be regarded as an automatic function, which will proceed without a hitch in every case if only the mother is sufficiently anxious to play her part. Although there are many women who breast feed their babies without the slightest difficulty, day-to-day observation of 1,500 consecutive mothers during their stay in a maternity hospital in Newcastle has shown that, even during these first few days, 20 per cent. encountered difficulties for the solution of which they required skilled help.

Treatment of some of these difficulties must begin during the pregnancy. *Inverted nipples* or those which protract poorly can be treated successfully by Waller's plastic shells, provided their use is started early and continued regularly throughout the last months of the pregnancy. Inverted nipples should therefore be looked for at the first antenatal consultation. If left untreated they will interfere with suckling: the baby will be unable to draw the nipple into the proper position at the back of his mouth and will damage it by his suction without obtaining any milk. We have not had the opportunity to assess the value of antenatal expression of colostrum which Waller strongly advocates in the prophylaxis of engorgement, but no one can fail to be impressed by the results he describes. If time can be found at subsequent consultations, a full explanation of the normal processes of lactation and suckling will guard against the disappointment and bewilderment which some women suffer during the first days of the puerperium.

After delivery the most common difficulty encountered in the 1,500 women studied here was *abrasion of the nipples:* this occurred in 170 cases.

To guard against it the baby should be left at each breast for only a minute or two on each occasion during the first few days, and the time gradually increased as the nipples become accustomed to the baby's suction. If damage occurs in spite of this, the baby should be kept completely off the affected nipple, and the breast emptied regularly, until healing has occurred: this usually requires at least twenty-four hours, often longer. We have been unable to obtain clear evidence of the value of any particular local application. Skilful manual expression is the best method of emptying the breasts; failing this a breast pump can be used. When the milk first comes into the breasts, usually on about the third day but sometimes considerably later, they may become overfull. This occurred, to a degree when actual pain was caused, in 56 of the women. At the first signs of *overfilling*, the breasts must be emptied regularly at feeding times: milk often has to be taken off before the baby is put to the breast, so as to reduce the tension and allow him to draw the nipple well to the back of his mouth. Even if no evidence of overfilling is found, it is wise at this stage for any surplus milk to be taken off after feeds as a prophylactic measure, and there is evidence to suggest that the period of lactation may be prolonged by this means. Occasionally the filling is so rapid that efforts to empty the breasts cannot keep pace with it; the resulting state of *engorgement*, in which the tension becomes so great that milk can no longer be expressed, was noted in 23 cases. It is then necessary partially to suppress lactation by the use of stilbœstrol in large doses (10 or 20 mg. every four hours) until milk can again be expressed. The stilbœstrol must then be stopped immediately, for fear of suppressing lactation completely. Complementary feeds are given until an adequate supply of breast milk returns, which may take up to a week.

Six cases of *mastitis* were seen, which responded to penicillin given systemically in large doses from the moment when the first signs of inflammation were observed. It is often difficult to distinguish between this condition and the engorgement of a breast segment: there is tender induration with flushing of the overlying skin in both, but in mastitis there is usually clear evidence of infection in the shape of fever and malaise. It does no harm to use penicillin in doubtful cases, and many abscesses could be avoided by this means. Stagnation of milk in the affected breast must also be avoided: this may be achieved by manual expression as above, but it may be necessary to use stilbœstrol as well in particular cases. Four women developed breast *abscesses*, either because the staphylococcus concerned was resistant to penicillin or because the antibiotic was used too late. Surgical treatment is then necessary, and in most cases it is wise to suppress lactation completely with stilbœstrol.

The routine of breast feeding must be adapted to the particular needs of the mother and baby concerned. But certain general principles are necessary as a foundation for the policy to be advised. It is our experience that during the first days of life most babies are satisfied by the small amounts of

colostrum which they obtain from the breast; the loss of about 10 per cent. of the birth weight during this period is regarded as physiological. The few babies who show definite signs of thirst are given an ounce or two of sterile water from a spoon in addition. When the milk comes in, some sort of routine is established fairly readily: usually babies weighing 7 pounds (3.2 kg.) or over do best with intervals of about four hours between feeds, and the smaller babies need to be fed more frequently. In any event both breasts should be used for each feed. It is one of the advantages of domiciliary midwifery that a routine suited to the individual needs of the nursing couple is more readily established. Feeding during the critical period when the mother first gets up, and her milk supply is often reduced for a few days, should be managed by giving complementary feeds, after each breast feed. The size of these complementary feeds should be judged by the baby's behaviour—a far more reliable guide than a pair of scales. If he appears ready to take more, he should be offered it, and when the supply of breast milk is re-established he will normally show it by being less eager for the complement.

ARTIFICIAL FEEDING

With artificial feeding the wise plan is to use one particular type of milk only, so as to become completely familiar with it. A full-cream milk can be used from the start in half the prescribed strength, with added sugar to make up the calorie value of 20 to the ounce. As with the timing, so with the quantity of the feeds—no rigid rule should be laid down. Some babies do well on less than the average requirement of 2½ ounces per pound (160 ml. per kg.) of body weight per day, whilst others require considerably more if they are to be content and gain weight satisfactorily. Digestive disorders in the baby are seldom if ever due to the particular brand of milk being used, and the situation is usually made worse rather than better by changing it.

INFECTIONS

One further general problem in the care of the newborn, that of the minor infections to which they are prone, assumes some importance because of the frequency with which they are encountered. Evidence on the incidence of these infections is available for a group of over 1000 babies, of whom more than half were born at home, studied in Newcastle during the early summer of 1947. The results are set out in the accompanying table, with the routine treatment advocated.

It is worth emphasizing that these are now regarded as minor infections only because they are so effectively controlled by appropriate chemotherapy. The value of sulphamezathine in the treatment of purulent conjunctivitis has recently been re-stated by Sorsby and Kane (1949). The recommended dose is 0.5 g. followed by 0.25 g. every six hours. Sulphamerazine may be used in the same dose, but at intervals of eight hours. If this fails, local treatment

with 10 per cent. albucid drops may be effective. If response is still unsatisfactory, the case should be referred to an ophthalmic surgeon as the naso-lachrymal duct may be obstructed.

INFECTIONS OCCURRING IN THE FIRST MONTH OF LIFE

Type of Infection	Incidence Per cent.	Treatment
Purulent conjunctivitis	18	Oral sulphamezathine
Skin pustules	13	Oral penicillin
Snuffles	8	Penicillin drops
Umbilical sepsis	4	Oral penicillin, local gentian violet
Thrush	3	Gentian violet, 1 per cent. aqueous solution
Onychia	2	Oral penicillin

The effectiveness of penicillin when given by mouth in the neonatal period is a great convenience, and the dose at present recommended is 20,000 units before each feed (Levin and Neill, 1949). Penicillin tablets are obtainable, which can be dissolved in water as required and given from a spoon. In the treatment of thrush the gentian violet is best applied by allowing one or two drops to fall from a spoon into the baby's mouth, where they will be distributed on the lesions by the movements of his tongue.

CONCLUSION

The satisfaction of having supervised a woman's pregnancy and confinement with skill and success has its logical sequel in the equally skilful and successful management of mother and baby during the critical neonatal period. The opportunities for the exercise of skill may often be less obvious and dramatic and the line drawn between success and failure less clearly marked, but the rewards of proper understanding and attention to detail are great in terms of happiness for all concerned.

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JAUNDICE AND ANÆMIA IN THE NEWBORN

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THE best approach to the clinical problems of jaundice in the new-born infant is by a preliminary study of the physiology of pigment metabolism and the blood changes that take place at and after birth. A knowledge of the rather complex changes that result in physiological jaundice simplifies the understanding of other forms of jaundice and helps in making decisions at the bedside of the sick infant.

PHYSIOLOGICAL ASPECTS

Physiological jaundice has long been held to be due to the destruction of red blood cells, of which the new-born infant finds itself possessed of a considerable surplus on changing from intra-uterine to extra-uterine life. This view dates from the introduction of van den Bergh's test and is correct so far as it goes, but it does not account for the fact that whilst in all babies there is a fall in the number of red blood corpuscles during the first few days of life, some develop jaundice and some do not.

Earlier views were based on the conception that jaundice was due to the escape of bile pigment from the liver cells or bile ducts into the circulation; and explanations of how liver damage, congestion or biliary obstruction might occur in the healthy neonate were manifold and ingenious, including even duodenal catarrh. But von Reuss in 1912 spoke of a "congenital (physiological) functional backwardness" of the liver cells, and the idea that physiological jaundice represented a failure of the young infant's liver to excrete surplus bile pigment was developed about that time, chiefly by the work of Yllpö (1913). This view is supported by recent experimental evidence, and it now seems certain that although both hæmolysis and functional immaturity of the liver play a part, the latter is the most important in determining the appearance of jaundice.

There is at the present time a considerable array of solid facts about the physiology of neonatal jaundice, besides a good deal of what might be called sound conjecture, although unsupported by experimental proof, and it will perhaps simplify discussion of the clinical types of jaundice if the most important data are enumerated and arranged in a logical order.

(1) The total number of red blood corpuscles at birth is in excess of the number required for extra-uterine life.

(2) The total number of red cells in circulation after birth is influenced by whether the umbilical cord is tied early or late. If late, the infant receives a considerable volume of blood from the placenta; if early, this "placental transfusion" is prevented from reaching the child. Physiological jaundice is more frequent in infants in whom the cord has been tied late and who therefore start life with a larger

excess of red cells than those who have had the cord tied early (Book, 1935).

(3) There is hyperbilirubinæmia of the cord blood or neonatal blood of the majority of infants; Findlay *et al.* (1947) found it in 81 per cent.

(4) The plasma gives the indirect positive van den Bergh reaction indicating that the pigment has not passed through the liver cells and the jaundice is not obstructive.

(5) The source of the excess of bilirubin in fœtal life is thought to be areas of breakdown of maternal blood in the placenta.

(6) Destruction of red cells which begins a few hours after birth further increases the amount of bilirubin in circulation.

(7) An increased rate of destruction of erythrocytes in the neonatal period, which has long been conjectured but has always been a difficult matter to prove satisfactorily, was demonstrated recently by Mollison (1948). Taking placental blood as representative of the new-born infant's blood, he injected placental erythrocytes into other new-born infants and measured the length of their survival. As a control he injected the erythrocytes of a normal adult into other infants and estimated their survival. He showed that during the first ten days of life the placental erythrocytes (and therefore, we may assume, the erythrocytes of the normal new-born infant) were destroyed at about twice the rate of the adult cells; thereafter the rate was the same in both. Because of the relatively greater number of erythrocytes in the blood of the infant the amount of bilirubin produced is probably three times greater proportionally than that normally being produced by the adult. Adults are able to deal with an even greater output of bilirubin than this without becoming jaundiced; not so the new-born infant; an impairment of the liver function in excreting bilirubin may therefore be inferred.

(8) Excretion of bile pigment by the liver in fœtal life is shown by the presence of the pigment in the meconium, but evidently only part of the circulating bilirubin is dealt with in this way, for in cases of congenital obliteration of the bile ducts, although the meconium may be lacking in pigment, jaundice is not present at birth.

(9) The placenta probably eliminates the bulk of surplus pigment from the fœtal circulation. A difference in bilirubin concentration in the umbilical artery and umbilical vein has been detected by some workers; Findlay (1947) found a difference of 14 per cent.

(10) The higher the level of serum bilirubin in the cord blood the greater the frequency, severity and duration of physiological jaundice (Davidson *et al.*, 1941).

(11) The total excretion of bile pigments in the stools in the first five days of life is less in the icteric than in the non-icteric infant. The urinary excretion of urobilin (which depends first upon the excretion of bilirubin by the liver into the bowel and then reabsorption into the blood stream of the oxidized pigment from the bowel) is also less in the icteric than in the non-icteric infant (Ross *et al.*, 1937). The greater the bile pigment content of the meconium of the newborn the less the tendency to develop jaundice (Yllpö, 1913). These observations strongly suggest an impairment of hepatic excretion of bilirubin in those infants who become jaundiced.

(12) The excretion of bromsulphthalein by the liver (as estimated by its elimination from the blood stream) has been found to be retarded in the first ten days of life (Mollison and Cutbush, 1949; Yudkin *et al.*, 1949), but other tests of liver function in the newborn have proved remarkably normal. There is no correlation between the height of the bilirubinæmia and the delay in bromsulphthalein excretion: the evidence afforded by this test is therefore only suggestive. The one test required to complete the picture, the actual measurement of bilirubin excretion, still presents great difficulties of performance.

(13) The premature (immature) infant, as might be expected if the theory of liver function impairments is correct, shows a greater frequency and a longer duration of jaundice than the full-term infant.

(14) Identical twins (who may be presumed to have a similar physiological constitution) behave alike as to the development or non-development of jaundice; whereas non-identical twins often differ (Scherbak, 1936).

CLINICAL ASPECTS OF JAUNDICE IN THE NEWBORN

Physiological jaundice should be regarded as the outward manifestation in

certain babies of a hyperbilirubinæmia present to some degree in all. There is a general correlation between the serum bilirubin level and the intensity of the icterus, but the individual baby's propensity for developing jaundice varies greatly (Davidson, *et al.*, 1941) and is perhaps determined by differences in vascularity of the skin. Probably more than half of all neonates show jaundice at some time, although this may be very transitory and so slight as to be only detectable in the scleræ or white areas of the hard palate. The important points for the clinician to note are that it seldom appears before the second day of life, that if it deepens its progress is measurable from day to day rather than from hour to hour (as in icterus gravis), and that it is usually gone by the tenth day, although in premature infants, and very exceptionally in full-term infants, it may last up to four weeks.

ICTERUS GRAVIS

In icterus gravis (hæmolytic disease of the newborn, erythroblastosis fœtalis) the same physiological conditions prevail, but the hæmolytic process instead of beginning after birth is active during fœtal life and is much more intense. There is also an anæmia resulting from the hæmolysis, and this factor may be of much more importance than the jaundice. To go into the cause of the hæmolytic process would be to enter the vast field of blood groups, immunology and genetics; but fortunately this is not really necessary. It is sufficient to say here that the antigen which originally gives rise to the production of an antibody (hæmolytic to the infant's blood corpuscles) in the Rh-negative mother's blood may be either the Rh-positive erythrocytes of the fœtus in a previous pregnancy or the erythrocytes of a previous incompatible transfusion. In the next pregnancy this antibody reaches the fœtus *via* the placenta and therefore may be circulating from the fifth month onwards. As the infant's blood is continually being destroyed during intra-uterine life, additional blood-forming tissue develops, chiefly in the spleen and liver (which become enlarged), and the loss is partially or fully compensated. At the same time the products of hæmolysis are excreted by the placenta; so an affected infant may be born looking perfectly normal.

Icterus gravis is a clinical picture which is often thought to be, and indeed appears to be, in some way precipitated by the change to extra-uterine life. Reference to the physiological data already given will show, however, that the explanation of the jaundice here is the same as in physiological jaundice; but the quantity of bilirubin liberated is very much greater and, the imperfection of liver function being the same as in any other infant, the jaundice appears much sooner and deepens rapidly. The jaundice and progressive anæmia after birth are the clinical signs of a process that has already been going on for some time before birth. In severe cases, of course, the compensatory erythropoiesis and placental excretion of bilirubin are inadequate, the fœtus is jaundiced and the pigment may colour the membranes and the liquor. The anæmia is intense, heart failure ensues with dropsy and death *in utero* or at birth (hydrops fœtalis). The severe

cases which survive for a few hours after birth often show cyanosis, ecchymoses, flaccidity, and failure of all the normal reflexes.

Diagnosis.—When jaundice is present at birth it may be assumed to be due to hæmolytic disease. Congenital syphilis affecting the liver and congenital atresia of the bile ducts, although giving rise to jaundice soon after birth, do not do so in intra-uterine life, as a consideration of the physiology will show, and the infant is therefore not jaundiced at birth. Textbooks differ on this point and generally hedge by saying "usually not". In any event the rapidly deepening jaundice of hæmolytic disease will make the diagnosis certain in a few hours.

When a baby is normal at birth but becomes jaundiced within twenty-four hours the diagnosis may be less certain. The features which point to hæmolytic disease are as follows:—

(1) A history of the mother having received a blood transfusion, even remotely in her past. In such a case the first-born child may be affected.

(2) A history of one or more previous pregnancies or miscarriages.

(3) A history of jaundice at birth or a known case of hæmolytic disease in other children of the family.

(4) The placenta may have been noticed to be abnormally large. Also the cord jelly, even in mild cases, may have shown some yellow staining at birth.

(5) The spleen is palpable. It should be felt with the fingers of the right hand approaching from the baby's right side. Likewise the liver, approaching with the left hand from the baby's left side, may be felt to be enlarged but less constantly than the spleen.

(6) The infant may show pallor as well as jaundice and is usually very lethargic. *Both jaundice and pallor increase at a rate that may be appreciated in hours rather than days.*

(7) Erythroblastæmia. Although in mild cases the number of nucleated red cells may fall within the normal range (1 to 15 per 100 white cells on the first day of life) there are usually many more than this and examination of a stained blood film may reveal that they far outnumber the white cells and that there are many primitive forms.

(8) Anæmia. The evaluation of a hæmoglobin reading on capillary blood taken a few hours after birth needs caution. The importance of the "placental transfusion" comes in here. If the cord was tied late, the infant who was anæmic at the time of birth may have received an extra amount of blood sufficient to put its hæmoglobin temporarily within the normal range (15 to 22 g. per cent.). If the reading is below the normal range it is certain that anæmia exists.

Special tests.—In laboratories equipped with the special sera the diagnosis may be confirmed by demonstrating the presence of the Rh antibody in the infant's blood. The antibody is fixed to the surface of the red blood cells. The ingenuity of the test lies in the fact that it is not the Rh antibody itself that is detected but the globulin with which it is compounded. The test, which is performed by mixing the infant's cells with rabbit's serum sensitized to human globulin, is known as the antihuman globulin test (Coombs, Mourant and Race, 1946) or the Coombs' test.

Rh typing reveals that the mother is Rh negative and the infant Rh positive. Very rarely differences between the AB groups of mother and child may give rise to sensitization of the mother and production of hæmolytic antibodies.

Subsequent course of the disease.—If untreated, the baby becomes pro-

gressively more and more anæmic. The jaundice deepens, but this is of less importance than the anæmia, which is likely to prove fatal. Three grave complications may arise during the first week:—

(1) A hæmorrhagic tendency develops, associated with hypoprothrombinæmia (a result, probably, of deficient synthesis of prothrombin by the liver), and epistaxis or repeated hæmatemesis or hæmorrhage into the lungs may be the final cause of death. This picture should not be confused with hæmorrhagic disease of the newborn, in which spontaneous bleeding (notably melæna) occurs in the first week of life. This has no connexion with jaundice although physiological jaundice may be present at the time.

(2) Kernicterus (bile staining of the basal ganglia). Fairly constantly about the third or fourth day an infant with this complication shows signs first of cerebral irritation, then profound cerebral depression. The features usually observed are: a plaintive grunting cry, convulsions, twitching, head retraction, spasticity and spontaneous giratory movements of the arms. Within twenty-four hours or less there follows loss of sucking and swallowing reflexes, respiratory arrhythmia, gasping, apnœa and death. Cases with milder symptoms may recover.

The clinical picture of cerebral damage associated with deep jaundice in the newborn seems to be peculiar to icterus gravis. It does not occur with the jaundice of biliary obstruction, and it is now agreed that the damage to the nerve tissue of the nuclei of the brain and medulla takes place independently of the presence of bile pigment, the staining of the nuclei being a secondary change in already damaged tissue. Nuclear jaundice has been demonstrated post mortem in infants dying of severe sepsis, who in life showed jaundice and cerebral disturbances. But de Bruyne and van Creveld (1948), in a careful scrutiny of two reported cases and two of their own, produced evidence which strongly suggested that Rh immunization in three of them, and immunization by blood group A in one of them, had played a part in causing the condition.

A few cases of icterus gravis develop, in later infancy, spasticity and choreo-athetosis. These infants are usually grossly mentally deficient. In some there will be a history of a "cerebral" episode in the first few days of life; in others these symptoms will have escaped notice. There is no evidence that icterus gravis, or Rh-immunization *per se*, can cause mental defect, except indirectly as a result of the neurological changes of kernicterus. Infants who recover without these sequelæ develop normally.

(3) Liver failure and cholæmia. In severe cases a toxic liver damage is a demonstrable pathological change. The deepening lethargy of these infants is reminiscent of the cholæmia of acute yellow atrophy of the liver and, as a clinical description, "liver failure" is apt for those cases of icterus gravis which die without signs of kernicterus, heart failure, hæmorrhage or severe anæmia. It is significant to note at this point that hepatic cirrhosis and an obstructive phase of jaundice may occur later on in recovered cases; but these will be considered under the heading of obstructive jaundice.

TREATMENT

It would be beyond the scope of this article to go into the relative merits of "exchange" and "simple" transfusion of blood and the precise indications as to whether or not to transfuse, and it will probably serve a more useful purpose simply to state the procedure to be adopted in two different circumstances: the first, when the birth of an affected child is anticipated; the second, when the diagnosis is made after birth.

In the first case, when the maternal history and laboratory data make it probable or certain that the child will be affected, the umbilical cord should be clamped at the moment of birth. This prevents the infant from receiving an extra quantity of blood (the "placental transfusion") containing antibody and cells destined to be destroyed; blood that the infant would be better without. Next, 10 ml. of blood should be taken from the umbilical vein with a syringe and put into an oxalate bottle. This may be used for the Coombs' test, Rh typing, the hæmatocrit, and an accurate estimation of the hæmoglobin. On the information given by these tests the diagnosis and the need for transfusion, and the urgency thereof, can be settled.

In the second case, when the diagnosis is made after birth, it must be remembered that very mild cases may not require any treatment at all. Mild or moderate cases are certain to become anæmic, but the main question to be decided here is the urgency or otherwise of transfusing. Any sign of hæmorrhage, of course, increases the urgency. Infants who are noticeably anæmic at birth should be transfused at once. Hæmoglobin estimations will give a rough guide as to the rate at which the anæmia is progressing. A level of 80 per cent. on the first day of life indicates that the infant is severely affected.

Breast feeding.—Antibody can be detected in the mother's milk, but apparently the amount absorbed, if any, is negligible and no immediate harm results (Cathie, 1947).

Induction of labour.—This subject deserves a brief comment as it is the only means at present available of attempting to diminish the severity of the disease. In certain severe cases which have been delivered at the 35th week of pregnancy and survived, it is difficult to believe that the baby would have been born alive had it remained *in utero* for another five weeks. One of the objections raised against early induction is that to the dangers of hæmolytic disease is added the risk of prematurity. Most of these babies, however, at the 35th week have quite reasonable birth weights, not less than four-and-a-half pounds, and do not present any difficulty as "premature babies". This may be because the obstetrical complications that usually form the background of prematurity are not present here. Still earlier induction would therefore seem to hold out more hope when a severely affected case is anticipated; but unfortunately the earlier in pregnancy that induction is attempted the less often does it succeed. It must also be remembered that the state of the fœtus is partly determined by the balance between the hæmolytic process to which its blood is being subjected, and by its own

powers of blood regeneration. Severe cases are fighting a losing battle throughout and will probably be found in a critical state however early they are rescued from intra-uterine conditions.

OBSTRUCTIVE JAUNDICE

Generally speaking the clinical diagnosis of obstructive jaundice in the first four weeks of life is made on the appearance of the stools, which are white and pasty, and the colour of the urine, which contains bile pigment, rather than on the character or time of appearance of the jaundice itself. When obstruction is complete at birth the meconium may be pale.

The possibility of obstructive jaundice being present at birth is difficult to reconcile with our knowledge of fœtal physiology. At all events the onset is early and the colour deepens steadily to a greenish hue. In spite of this there is astonishingly little disturbance of feeding and nutrition and the child may thrive for many weeks. The liver is usually palpable about one finger's breadth, but marked enlargement associated also with enlargement of the spleen suggests cirrhotic changes, and if wasting and ascites are added this is certain.

Such a clinical picture is straightforward enough, but there are cases in which the jaundice appears late and cases in which physiological or hæmolytic jaundice is present at first but signs of biliary obstruction supervene later. The older physicians spoke of "icterus neonatorum gravis (seu prolongatus)". In both instances the obstructive features may be transient, lasting a few days or weeks, and the obstructive phase may recur several times.

The impossibility of discussing the differential diagnosis of the obstructive picture briefly unless at the expense of accuracy must afford an excuse for the very simple presentation of the etiology which follows:—

Main causes of obstructive jaundice.—(1) Congenital anomalies of the bile ducts. (2) Cystic dilatation of the bile duct. Seldom seen in the first month. Abdominal swelling nearly always palpable. (3) Inspissated bile plugging main ducts or common duct. (4) Conversion of bile ducts into a fibrous cord (Skelton and Tovey, 1945). (5) Pigment stones. (6) Intrahepatic biliary obstruction due to liver-cell damage which may lead to cirrhosis (Lightwood and Bodian, 1946). There is much evidence to suggest that *the last four may be associated with hæmolytic disease.*

Preliminary investigation must include Rh typing and tests for Rh antibody in mother and infant, a blood count and examination for erythroblastæmia, and the Wassermann reaction. In view of the very bad prognosis of unrelieved obstructive jaundice nearly all cases of persistent obstruction deserve a laparotomy. The postoperative mortality is high when clinical deterioration has set in, but a preliminary transfusion or paracentesis when either anæmia or ascites is present may bring about a marked improvement.

OTHER RARE FORMS OF NEONATAL JAUNDICE

Congenital syphilis.—The liver is much enlarged. Jaundice is slight. Other features of congenital syphilis are present and the Wassermann reaction is positive.

Severe septic infection.—The infant having been well for the first week of life becomes very ill on the fifth day or later. Infection of the umbilicus may sometimes be obvious. There may be pyrexia, diarrhœa, vomiting and marked anæmia. Hæmolytic disease can only be excluded with certainty by Rh typing and the Coombs' test.

Familial acholuric jaundice.—Persistent mild jaundice, slight anæmia and splenomegaly are occasionally seen in the new-born infants of affected families. Precise diagnosis rests on the detection of spherocytosis and increased corpuscular fragility and the exclusion of Rh or blood group iso-immunization.

ANÆMIA IN THE NEWBORN

Certain facts about the physiology of the blood have already been mentioned (pages 19 and 20). The number of erythrocytes in the blood a few hours after birth varies from 5.5 to 7.5 millions and the hæmoglobin is in the region of 140 per cent. There is a steady fall in the hæmoglobin level and red cell count during the first three months of life, the hæmoglobin reaching a level of about 75 per cent. This is due to the combined effect of diminished blood formation and rapid growth, with accompanying rapid increase in blood volume, and is a normal physiological picture and not a state of anæmia. The effect is particularly marked in the premature infant, who starts life with a slightly lower red cell count than the full-term infant and whose rate of increase in size is relatively much faster. Babies of 3 lb. (1,360 g.) or less often have a hæmoglobin level of 50 per cent. or less when ten weeks old. Blood transfusion can have only a temporary effect, and so long as the infant is thriving need not be considered. Iron given in the early weeks to premature babies does nothing to prevent the fall in hæmoglobin, but when blood cell production increases spontaneously at about the third month the rise of hæmoglobin is slightly more rapid in babies who have had iron from the start than in those who have not. This small benefit seems to be worth having. A good way of giving iron to premature infants is in the form of iron and ammonium citrate. One grain (65 mg.) will dissolve in 3 minims (0.2 ml.) of water. The first dose at the age of three weeks should be one drop three times a day, in the feed, and should be increased slowly to nine drops three times a day, a total of 9 grains (0.6 g.) per day.

Pallor.—There is always a change from the rather plethoric appearance of the newly born infant on the first day to a paler, somewhat shrunken appearance on the third day, but the mucous membranes remain a good colour. The sudden appearance of intense pallor which also affects the mucous membranes is due to *hæmorrhage*. If the source is not visible (umbilical cord, umbilicus, hæmatemesis) bleeding into the bowel must be

remembered. Transfusion is urgent. Group O, Rh-negative blood should be used. The blood volume is calculated roughly at 40 ml. per pound (0.45 kg.) of body weight and one-third or half this amount will probably need to be restored.

Intense pallor of insidious onset is seen in *congenital anæmia*, another form of hæmolytic disease of the newborn in which jaundice is inconspicuous or absent and hæmolysis more gradual. At the age of three weeks or later the infant appears quite blanched and is generally œdematous.

Acute infection of any kind in the newborn may be accompanied by a moderate degree of anæmia and the correction of this by transfusion may speed recovery.

A NOTE ON THE INCIDENCE OF HÆMOLYTIC DISEASE OF THE NEWBORN

The main facts of this fascinating but difficult problem are summarized very clearly by Mollison, Mourant and Race (1948) in the M.R.C. Memorandum No. 19. They estimate ("on the supposition that it is more helpful to have a rough estimate than no estimate at all") that of 100 children taken at random there are 10 Rh-positive children whose mothers are Rh negative. The incidence of hæmolytic disease, however, seems to be only about 1 in 200, but taking all pregnancies other than first pregnancies it is probably nearer 1 in 130. Now, congenital pyloric stenosis has an incidence of about 1 in 250 males (Wallgren, 1941) and pyloric stenosis is considered a fairly common disease. Hæmolytic disease, then, is probably about as common as, or perhaps more common than, pyloric stenosis. Although many Rh-sensitized mothers are now being singled out for hospital delivery, the majority of affected infants are still being born in the field of general practice. This fact must excuse the considerable emphasis which has been given to the subject in this article.

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RESPIRATORY INFECTIONS OF THE NEWBORN

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THE hazards to which the new-born child is subjected can be seen from infant mortality figures. In 1945 the number of deaths in the first year of life was 47 per 1000 live births, and 24.8 of these occurred in the first month. The common causes of these neonatal deaths are birth injury and asphyxia, which together account for about half, and infection, which is responsible for about one-fifth, whilst Macgregor's (1943) post-mortem figures showed that the incidence of infection rose steadily through the first month until, in the fourth week, 82.4 per cent. of her cases showed evidence of some infection—not always the direct cause of death. The two infections mainly responsible are gastro-enteritis and respiratory infections.

Cruickshank (1945) has stressed the poor response of the infant's tissues to infection even by organisms of low virulence. The immature reticulo-endothelial system is capable of only a poor production of antibodies, and the leucocyte response is often characterized by the number of immature cells. Although the infant seems to inherit a temporary immunity to most specific fevers, with a notable exception in whooping-cough, he is liable to fall victim to organisms of little or no pathogenicity to adults, which he is unable to localize, so that a widespread and often fatal infection may develop. Torrey and Reese (1946) were unable to grow organisms from the noses of 95 per cent. of 105 normal full-time babies within four hours of birth, but by the eighth day, 88.5 per cent. of them carried a coagulase-positive *Staphylococcus aureus*. Yet the mucosa of the nose and throat of the newborn appears to be relatively intolerant to pathogens, which soon disappear, for, although there is little protection against them, they seem unable to thrive in this area, presumably due to biological causes (Kneeland 1930).

The primary expansion of the lungs requires a negative pressure of about 20 cm. of water, and about twice this pressure is possible under favourable conditions. But anoxia, perhaps associated with the general weakness of prematurity and some cerebral damage, may prevent the initial respirations, especially if the respiratory passages are filled with amniotic contents; many days may pass before both lungs are fully expanded, even in healthy babies, and the atelectatic portions may become infected. Respiration in early life is predominantly abdominal and tends to be irregular with a rate of about 40 to the minute during the first week.

As in adults, protection of the lungs is effected by warming and moistening the air in the upper respiratory passages, where filtration of foreign

matter also takes place. This is accomplished by a sheet of mucus continuously moved backwards into the pharynx by underlying cilia. The infant's nose, however, has narrow passages which readily become blocked, and the soft cartilages may sometimes be seen to fall in with each inspiration. The cilia soon cease functioning in a dry atmosphere so that the mucus sheet cannot work effectively. This ciliary action is continued in the lower respiratory passages, where cough aids expulsion, although the cough reflex may be absent in small premature infants. The nasal sinuses are similarly supplied, and it should be noted that the maxillary antra and ethmoidal cells are present at birth. Narrow choanæ and an acutely angled palate also increase the tendency to nasal obstruction, whilst the lymphoid tissue of the nasopharynx is relatively increased. Although the whole respiratory tract functions as a unit, either the upper or the lower part may be attacked by infection.

UPPER RESPIRATORY INFECTIONS

Certain infections, such as acute tonsillitis, are hardly ever seen in infancy, but *the common cold* occurs and differs in some respects from that seen in later childhood.

The cold is usually mild at this age and may present few signs. Nasal discharge tends to be slight or absent, probably because the child is lying on the back, so that secretions trickle backwards into the nasopharynx. The nose readily becomes blocked and interferes with breathing, for the newborn baby cannot breathe through the mouth, and cyanosis and vomiting may occur. This, coupled with the anorexia of an infection, leads to refusal of feeds. Fever, if present, tends to be maximal at the onset, but there may be none, whilst inspection of the throat reveals only mild injection, and coughing and sneezing are often absent. In favourable cases the condition clears in about a week. The dangers of this condition are twofold: first, direct spread to the lower respiratory tract or ears, and secondly, the development of gastro-enteritis. Spread to the ears occurs *via* the straight and short Eustachian tubes. Frequent examination of the ear drums should be made and myringotomy done at the first sign of bulging or when the drum remains thickened and gray and the child's condition is not improving. A meningeal reaction not infrequently occurs in cases of otitis, when a lumbar puncture is essential to rule out meningitis. Gastro-enteritis is a serious complication carrying a heavy mortality, but it cannot be discussed here.

Diagnosis.—A cold is more likely to be overlooked and passed off as a feeding disorder than to be mistaken for another disease. The snuffles of congenital syphilis produces a more profuse and often blood-stained mucopurulent discharge, and some other manifestation, such as a skin rash, especially round the mouth, is likely to be present. Congenital obstruction of the choanæ causes gasping respirations and discharge of mucus, which

cannot escape into the pharynx, but the occurrence from the time of birth, and obstruction to the passage of a fine probe, will point to the diagnosis.

Treatment.—Prevention is of the first importance and applies to everyone caring for the child, including the mother. Masks should be worn and should be of the double type with a sheet of paper between the two layers of gauze, whilst no one with a cold or sore throat should approach an infant.

The patient should be isolated in a warm room with a moist atmosphere —the effect of drying on the cilia has been mentioned. It will often be necessary to clear the airway gently, and nasal congestion may be relieved by the instillation of ½ per cent. ephedrine in normal saline. These drops are best given shortly before feeds, at not less than three-hourly intervals, for two or three days only. Oily drops should never be given for fear of the development of lipoid pneumonia later. Prophylactic oral penicillin or sulphonamide may be started and is a wise precaution in weakly babies or when the secretions become purulent. The child should be turned from side to side at intervals to avoid any tendency to pulmonary collapse. Feeding requires care to avoid regurgitation and subsequent inhalation, and should never be forced, although extra fluid in the form of boiled water will be needed.

LOWER RESPIRATORY TRACT INFECTION

BRONCHO-PNEUMONIA

The distinction between bronchitis, especially of the finer tubes, and broncho-pneumonia is ill-defined, and lobar pneumonia as found in older subjects rarely occurs, so this description will be confined to the group of conditions loosely called broncho-pneumonia.

Causal factors.—Theoretically, respiratory infection may be antenatal, natal, or postnatal. For the first to occur, some disease of the placenta would be probable, as organisms the size of bacteria cannot traverse the placental barrier, so that respiratory disease of this nature must be very rare. During labour the membranes may rupture early and the amniotic contents become infected, so that inhalation may cause pneumonia. An asphyxiated infant may respire prematurely and inhale either amniotic or vaginal contents. These cases are likely to show signs in the first few days of life, whilst infections which develop later are postnatal in origin.

Some idea of the frequency of pneumonia is given in the careful report by Macgregor (1939) in which she records 177 cases found in 541 consecutive necropsies in infants up to twenty-eight days old. Over half of these died in the first week and many showed microscopic evidence of *inhalation during birth*, for although the fluid part of amniotic contents cannot be demonstrated, cornified epithelial cells from the fœtus as well as vernix caseosa, which contains 10 per cent. of fat and therefore takes fat stains well, were frequently seen. In severe cases masses of both were present, whilst in those lungs into which air had entered, vernix could be seen as a

lining to the bronchioles and aveoli—the so-called vernix membrane (Farber and Sweet, 1931). *Fœtal asphyxia* played an important part in all but mild cases and was often the chief cause of death, in which event pneumonic changes were slight and required microscopy to demonstrate them. Pneumonia of this type was rarely found later than the third day of life.

Recently Rhaney and Macgregor (1948) described a group of infants who died from pneumonia as a result of *aspiration of gastric contents*. Most of these occurred in the second half of the first week of life. The pathological changes were areas of hæmorrhage, often large, and marked bronchial inflammation with pus in the lumina. Digestion by gastric contents was marked, and a distinctive feature was lysis of the many red cells in the exudate. These cases were usually seen in premature infants, or in those enfeebled by some such cause as cerebral hæmorrhage, and demonstrate the need for care in feeding such infants.

It is not surprising that another important cause of pneumonia is *atelectasis*, again chiefly due to asphyxia, although without evidence of inhalation as just described.

Macgregor's other two groups chiefly occurred in infants over one week old and comprised broncho-pneumonia of a type similar to that seen in older patients, and "pneumonia" due to metastatic deposits from a bloodstream infection. The criteria of the former (McNeil *et al.*, 1929) were bronchitis and peribronchial pneumonic changes without evidence of aspiration of foreign matter. The latter is really an infected infarct. Another type of neonatal pneumonia recently described by Adams (1948) is virus pneumonia which is somewhat akin to the atypical pneumonia of adults.

The bacteriology of pneumonia at this early age differs from that occurring later and the most common organism found is *B. coli*. As pneumonia from this cause is practically confined to patients under one month of age, it appears that the newborn lacks immunity until this is acquired as the result of the development of large numbers of coliform organisms in the bowel. To a lesser degree other bacteria of low pathogenicity such as *Streptococcus viridans* may be at fault, whilst the only one of marked virulence frequently found is *Staphylococcus aureus*.

Diagnosis.—The clinical diagnosis of the disease is often difficult and many babies die with the condition unsuspected, especially prematures. In those several days old the symptoms of a cold may be present, but abnormal signs may not be detected. Fever is often absent, notably in premature infants. Cough also is less marked than in older patients, and is often absent in the very small. Cyanosis, often of an ashen hue, is prone to develop, and breathing is seen to become rapid and shallow with recession of the lower ribs and dilatation of the alæ nasi. Weakly babies are liable to become comatose. The early development of diarrhœa and vomiting may falsely direct attention away from the chest. Physical signs are notoriously de-

ceptive, for extensive disease may exist with little to show for it, and although moist sounds are usually heard diffusely, the tell-tale fine crepitations are difficult to elicit and consolidation is extensive before dullness to percussion is found. Even an X-ray needs care in interpretation, especially in the first week of life when atelectasis is often present, either in the form of a regional opacity or scattered shadows. The common radiological appearance is one of small scattered opacities chiefly near the hila and at the bases. There is usually a leucocytosis with polymorphonuclear increase, but some infants may have a scarcely raised white count, with a number of immature cells in the differential count. A blood culture is often positive.

SPECIAL TYPES OF PNEUMONIA

Staphylococcus aureus.—Although uncommon in later life, staphylococcal pneumonia is common in the first year and may be primary from an upper respiratory infection or secondary from staphylococcal sepsis elsewhere, notably of the skin. The former is more common and takes the form of hæmorrhagic consolidation which rapidly breaks down into abscesses which are often located in the lower lobes near the pleura, with resulting rupture into the pleural cavity, so that empyema is frequent. Toxæmia is severe and the temperature usually high and swinging. The mortality rate is high. An associated pyæmia with abscesses will point to the diagnosis.

Virus pneumonia.—Such cases do not seem to have been reported from this country, but Adams (1948) has described three outbreaks in infants in obstetric units, almost all in the first month of life, some on the first day. The symptoms were cough, dyspnœa and cyanosis. X-rays usually revealed some pulmonary infiltration, and the diagnosis was made by finding inclusion bodies in smears of the pharyngeal mucosa of both mothers and infants, and from the bronchial and alveolar epithelium of those who died. Adams suggests serum or gamma globulin for treatment.

Pulmonary symptoms, which are an essential part of the clinical entity known as cystic fibrosis of the pancreas, are sometimes seen soon after birth and may precede the appearance of foul bulky stools. Such children take their feeds well but fail to gain weight, and their progress is marked by frequently recurring bouts of respiratory infection. In such cases the duodenal juice will be found to have a reduced or absent trypsin content.

DIFFERENTIAL DIAGNOSIS

The difficulty of making a correct diagnosis has already been mentioned and the following conditions, not primarily pulmonary, should be remembered:—

Congenital atresia of the œsophagus with tracheo-œsophageal fistula, in which the upper part of the œsophagus ends blindly and the lower part communicates with the trachea. In these infants attacks of choking, cyanosis and vomiting occur from the first with every feeding, and pneumonia soon follows from aspiration of the contents overflowing from the upper blind

portion of the gullet. Early diagnosis is essential so that surgery may have a chance, and is made by passing a catheter which is held up by the obstruction and confirmed by running in some lipiodol. Owing to the risk of aspiration, barium should never be used.

Diaphragmatic hernia.—Abdominal contents may pass up into the thorax through a congenital defect in the diaphragm, nearly always on the left side, as the right half of the diaphragm is protected by the liver. Infants so affected suffer from cyanosis and dyspnœa, especially after feeding, owing to pressure on the lung and consequent shift of the mediastinum. If bowel has passed through the gap, bowel sounds may be heard in the chest, and the signs will depend upon the amount of abdominal contents present in the thorax. Diagnosis can be made from a plain X-ray film, and surgery should be undertaken early.

Massive suprarenal hæmorrhage.—The onset is sudden and the condition soon fatal. Cyanosis, pyrexia and restlessness with severe shock develop without cough or signs in the chest. Rarely the enlarged suprarenals may be felt.

COMPLICATIONS

Blood-stream infection is always a danger and may lead to such complications as meningitis. Gastro-enteritis may supervene and cause death in an otherwise mild case. Empyema has certain characteristics, as staphylococcal pneumonias are far more often so complicated than any other type. This is due to rupture of a subpleural focus and, as this focus is also commonly in communication with a bronchus, pyopneumothorax is frequent, the influx of air raising the intrapleural pressure and causing pulmonary collapse with shift of the mediastinum to the opposite side. The mortality is high, and although other cases of empyema are sometimes cured by daily pleural aspiration with the instillation of penicillin, yet the danger of tension pneumothorax suggests that staphylococcal cases should be treated by means of an intercostal tube with under-water drainage, as advocated by Watkins *et al.* (1948).

TREATMENT

Prevention, again, is of the greatest importance and, besides wearing masks, all attendants should have nose and throat swabs taken at frequent intervals while on duty in neonatal nurseries. Recently it has been shown that a high proportion of hospital workers carry a penicillin-resistant *Staphylococcus aureus*, and these should be excluded from duty. Affected infants should not be overclad; heavy clothing only restricts respiratory movements and warmth may be maintained by hot-water bottles. Room temperature should be kept at about 65° F. (18.3° C.), and a baffle board below the lower sash of the window will allow a free circulation of air without draughts.

Skilled nursing is vital and great care should be used in feeding so that

the child does not inhale regurgitated milk. The head of the cot should be slightly raised. Oxygen administration should be started early and is preferably given by means of a small transparent tent enclosing the whole body. The oxygen cylinder should be connected with a flow-meter containing warm water, and gas delivered at a rate of about three to four litres a minute. If no tent is available, a rubber funnel fitting the baby's face closely may be used, for in very small infants a catheter may easily damage the delicate nasal mucosa and one of the small calibre necessary often becomes blocked with mucus.

Chemotherapy should be started as soon as the diagnosis is suspected and both penicillin and a sulphonamide preparation given. There is now ample proof that *penicillin* given by mouth in the first few weeks of life is as effective as when given by injection, always provided that vomiting or diarrhœa is not present. A dose of 20,000 units three-hourly or 30,000 units four-hourly, given in a spoon before feeds, maintains a therapeutic blood level (Moseley, 1948) or the same dose may be given parenterally. Of the various *sulphonamides* available, sulphamezathine has given good results and should be given in amounts of 0.25 g. four-hourly for the first two days, followed by the same quantity six-hourly for three to four days. The tablets should be crushed in a little water and given by spoon. When vomiting is present, sulphonamide should be given intravenously, by which route the fluid requirements can also be met, or it may be given subcutaneously in the form of 5 per cent. sulphadiazine in normal saline, in amounts of 0.15 g. per kg. body weight per twenty-four hours, divided into two equal doses at twelve-hourly intervals. In penicillin-insensitive cases *streptomycin* in a dosage of 20 mg. per lb. (44 mg. per kg.) body weight per twenty-four hours, divided into injections every six hours, may be tried. There would also seem to be a future for the new drug *aureomycin*, which may be given orally at six-hourly intervals in a dosage of 25 mg. per kg. body weight per twenty-four hours. Aureomycin is effective against many gram-negative as well as gram-positive organisms.

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GASTRO-ENTERITIS IN THE FIRST MONTH OF LIFE

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Infants do not suffer from gastro-enteritis in the first month of life as often as they do in each of the next few months. Nevertheless, the disease is a considerable hazard to their existence at this age, as may be gathered from the Registrar-General's Statistical Review, in which it is recorded that 861 deaths from gastro-enteritis took place in England and Wales in 1947, out of a total of 20,102 deaths from all causes in the neonatal period. The figures for 1946 are not greatly different.

The dangers which beset the otherwise healthy young infant are compounded of infection, ignorance and mismanagement, and hence are largely found in the poorer and more uneducated sections of a community. So long as an infant is breast fed, the chance of an attack of gastro-enteritis, or at least of a fatal attack, is less likely. The majority of infants who require hospital treatment in this country are breast fed only for the first few months of life. Of 300 infants seen at the Southampton Children's Hospital for various ailments, 227 (76 per cent.) had been weaned to artificial mixtures on one pretext or another by the end of the fourth week. By contrast, 86 per cent. of 58 infants entered for a local baby show had been breast fed during the first six months. Under suitable conditions, as found in most middle-class homes, an infant can be reared quite satisfactorily on appropriate milk mixtures. But from the moment an infant is fed artificially, the chances of intestinal infection increase.

CLASSIFICATION

As the nature of the causal agent of so many individual cases and epidemics of gastro-enteritis remains unknown, classification of the disease is as unsatisfactory as that of the rheumatic conditions, but serves some purpose as an aid to the direction of treatment. It seems to me that Brennemann's (1947) grouping into the (1) non-infectious diarrhœas, and (2) the infectious diarrhœas, is as helpful in this connexion as any other.

GENERAL SYMPTOMS AND SIGNS

Certain features constitute a syndrome in the gastro-enteritis of young infants, irrespective of the cause. This syndrome is made up of vomiting and diarrhœa, with failure of appetite, leading to manifest dehydration, acidosis, and the appearance of toxicity. Initially there may be convulsions

without necessarily any organic changes in the central nervous system. In milder cases the appetite may not be much affected, vomiting minimal, the stools rather more frequent, loose yellow or slightly green, and dehydration non-manifest. In more serious cases, vomiting and diarrhœa are exacerbated, the abdomen distended, little or nothing is retained by the mouth, the stools become copious, green and fluid, and dehydration is marked. Young infants at this stage become toxic, pinched-looking and grey.

The temperature may be raised, normal or even subnormal. There is always acidosis. Clinical signs of acidosis as judged by the depth and rapidity of the respirations may not be evident, but the CO_2 combining power of the blood is always lowered. Several factors enter into the production of this acidosis. The infant is deprived of the normal salt intake by reduced appetite and by vomiting. There is a loss of the pancreatic secretions and consequently an important loss of base in the motions.

The blood is concentrated and reduced in volume. The velocity of the circulation is decreased so that tissue respiration is interfered with and excess of free carbonic acid may not be prevented by hyperventilation. The kidneys of the new-born infant are functionally immature and this, combined with the diminished blood circulation in the kidney, prevents the normal excretion of the products of endogenous metabolism, so that the lactic phosphate and sulphate ions accumulate at the expense of the bicarbonate ion, leading to a serious reduction in the alkali reserve. At this severe stage of acidosis intracellular metabolism is affected and potassium is lost. As a result of the loss of fluid and electrolyte young infants rapidly die unless these elements are adequately replaced.

THE NON-INFECTIOUS DIARRHŒAS

As implied in the term there is no case-to-case transfer of the disorder. Non-infectious diarrhœa arises from the giving of unsuitable food, from food poisoning, or from the ingestion of drugs *via* the breast or otherwise, and includes cases due to feeding errors, organic and functional disorders. In the newborn, as in older infants, food poisoning may result in explosive outbreaks from the contamination of milk or water by toxin-producing staphylococci or other organisms. Under modern conditions this is unusual, at least in nurseries where dried or evaporated milks are used or raw milk mixtures are hygienically prepared and stored. It is possible that the elaboration of unknown toxins in the milk may be a cause of so-called epidemic diarrhœa of the newborn, described later under the infectious diarrhœa group.

THE INFECTIOUS DIARRHŒAS

These are transmissible disorders due to the action of pathogenic organisms, viruses or unknown agents within the body, and comprise:—

(a) Those cases in which the gastro-enteritis is considered to be a symptom of an infection other than of the gastro-intestinal tract, notably infections of the naso-pharynx, middle ear and mastoid, blood, meninges; and less often the skin and renal pelvis (so-called parenteral diarrhœas).

(b) (i) Those cases found to be due to a recognized or possible pathogen isolated from the intestinal discharges. (ii) Those cases in which no pathogenic agent can

be isolated from the intestinal discharges and there is no recognizable infection elsewhere in the body (so-called enteral diarrhœas).

The presenting symptoms and signs in the above groups are generally similar and the allocation of cases depends upon careful clinical, bacteriological and epidemiological assessment. This involves a study rarely possible in the home under the environmental conditions where such cases arise.

(a) *Gastro-enteritis associated with infections of the nasopharynx, middle ear and mastoid*

Young infants have little natural immunity to infection by cold viruses and the secondary bacterial invaders, streptococci, pneumococci, staphylococci, *H. influenzæ* and *E. coli*, and gastro-enteritis is a frequent though not invariable concomitant of such infections. The etiological relationship is uncertain. They may at one time precede, and at another follow, gastro-enteritis. Many pædiatricians believe that when upper respiratory infection, and particularly infection of the middle ear, is primary, it is the cause of the gastro-enteritis, and the frequency with which the latter is relieved on treatment of the infection is good clinical evidence in support of their view. The mechanism by which the digestive disturbance occurs is not understood.

The number of babies who develop parenteral infections and diarrhœa in the neonatal period is small compared with that of the second and following months, because they are naturally less exposed to older contacts and other sources of infection. Only ten infants under one month of age suffering from gastro-enteritis were admitted to the Southampton Children's Hospital between July 1947 and July 1949, out of a total of 185 infants suffering from the complaint. Five of these had an upper respiratory infection, including otitis media, when first examined. In Alexander's series (1948) only 15 of 320 cases of diarrhœa under six months of age were neonatal infants; 149 were aged two months or under and nearly 50 per cent. of these had parenteral infections on admission.

The implication that upper respiratory infections found on admission are primary is not necessarily a matter of fact and may only be assumed when the duration of the gastro-enteritis is known to be short. But unless such infections are recognized and treated they are a major factor responsible for the prolongation of the digestive symptoms. In this connexion Marriott (1925) and, more recently, Hall (1948) have emphasized the possible rôle of mastoiditis, and particularly silent or latent mastoiditis, which may occur in young infants despite apparently adequate drainage of the middle ear.

Septicæmia of the newborn.—Vomiting and diarrhœa may be the presenting or intercurrent symptoms in blood infections of the newborn. The condition, now less common than in former years, usually arises within the first two weeks of life and is characterized by fever, jaundice, enlargement of the liver and spleen and complications like purpura, convulsions and meningitis. Pyæmic abscesses may occur in any situation. On the other hand, these symptoms may be absent and signs of illness indefinite, when the diagnosis during life will depend upon the results of blood culture.

Debré and Mozziconacci (1949) describe 16 cases of septicæmia alone and an additional 25 cases of meningitis with or without septicæmia in infants. All but six were six months of age or under. One case of septicæmia occurred at one month of age, whilst 12 who had meningitis with or without septicæmia were one month of age or under. Diarrhœa and vomiting, abdominal distension and intense dehydration dominated the clinical picture in the septicæmic types of the disease. Nearly all had a polymorphonuclear leucocytosis. Blood culture was positive in 27 out of 32. *E. coli* was most frequently grown and then *S. typhi-murium* and *enteritidis*, *Str. fæcalis*, *Str. pneumoniæ*, *Ps. pyocyanea* and the meningococcus.

The prognosis, formerly poor, has been greatly improved by treatment with the sulphonamides and antibiotics.

Meningitis is by no means rare in the neonatal period and, as pointed out by Craig (1936), can be difficult of diagnosis as the signs and symptoms are apt to be atypical. Vomiting and diarrhœa are usual, as are fever, restlessness and convulsions, but neck rigidity is absent and Kernig's sign indeterminate. The fontanelle may not bulge if there is dehydration, and owing to the prominence of the intestinal symptoms the essential diagnosis may be overlooked unless meningitis is considered and lumbar puncture performed. The causal organisms are the same as those found in septicæmia, and the frequent incidence of the intestinal bacteria and salmonella group must again be noted.

Henderson (1948), in a review of the literature, cites 45 cases of salmonella meningitis in infants under a month old, out of a total of 147 of all ages, from 1907 to 1943. He emphasizes the prominence of diarrhœa at this age, the tendency to occur in epidemics, and the rapidly fatal course. There was only one recovery in the 45 cases reviewed. *S. enteriditis*, Dublin type, was isolated in 12; *S. typhi-murium* in 7; and *S. havana* (in an outbreak in Cuba) in 21.

S. typhi-murium, *S. newport* and *paratyphoid B.* are the most common members of the salmonella group responsible for infantile meningitis and other salmonella infections in this country.

In Debré's series of 25 cases of meningitis, with or without septicæmia, *E. coli* was grown from the cerebrospinal fluid or blood in 11 instances, *Str. pneumoniæ* in 6, *Proteus vulgaris* in 3, *Ps. pyocyanea* in 3 and salmonella organisms in 2.

(b) *Gastro-enteritis comprising* (*i*) *those cases due to recognized or possible intestinal pathogens, and* (*ii*) *those cases due to undetermined causes*

When the cause of diarrhœa remains unknown, the classification of the diarrhœa as "enteral" is illogical as the term implies that the causative agent flourishes in, and has a selective pathogenic action on, some part of the intestinal tract. Diarrhœas of undetermined origin are not necessarily due to some unknown agent acting *within* the digestive tract. However, the subgroup is conveniently used in differentiation. Cases falling into these two subgroups are clinically and epidemiologically similar and must be differentiated by laboratory methods. They account for the largest proportion of cases of gastro-enteritis admitted to, or cross-infected in, hospital, or otherwise arising in nurseries as epidemics.

The source of these diarrhœas is the endemic pool of specific and non-specific intestinal infections spread unevenly over the entire country through rural and urban communities, smouldering or dying out in one place and flaring up into epidemic violence in another. The activity of the

infection in any one area is conditioned by such factors as public and domestic hygiene, population status (residential or floating), avenues of communication, carriers, bacteriological cleanliness of food and water,

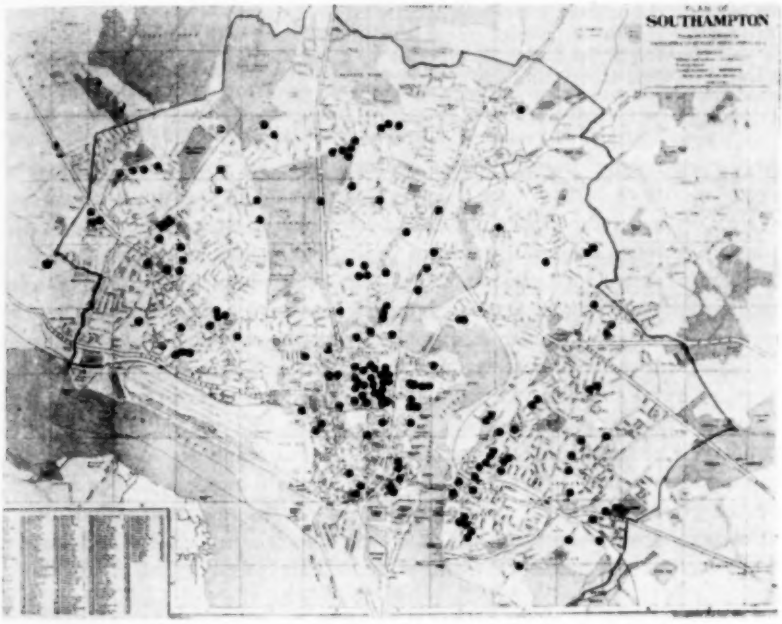

FIG. 1.—Map showing location of cases of gastro-enteritis admitted to Southampton Children's Hospital, July 1947—July 1949

immunity and organismal virulence. In towns and cities the spread of infection is modified by the different living conditions. But here also gastro-enteritis is endemic, although cases coming under hospital observation appear to be unrelated unless domestic surveys are made. If the residence of each patient is pin-pointed on a map it will be observed that the endemic pools are concentrated in more or less well-defined areas: always the congested districts with inferior housing conditions (fig. 1).

The youngest infants form the bulk of those who contract these specific and non-specific intestinal infections. Hospital admissions on account of gastro-enteritis are fewer during the first month of life than during subsequent months. The explanation must be that most infants are breast fed at least for some weeks and in other ways enjoy protection, for premature and neonatal infants are highly susceptible. Thus in maternity nurseries the morbidity can be higher and the mortality greater from epidemics of diarrhœa than at any later stage of infancy.

Accepted pathogens occasionally causing infantile diarrhœa in this country are those of the dysentery group, *B. flexneri* and *B. sonne*, and those of the salmonella

groups, *S. typhi-murium* and *S. enteritidis*. The pathogenicity of certain other organisms, notably *Proteus morgani*, *Ps. pyocyanea*, *B. alkaligenes* and coagulase-positive staphylococci, which are often found in the stools, is still doubted by most authorities. One or more of these doubtful pathogens, however, or others in the same category, such as the paracolon bacillus or the hæmolytic *Streptococcus fæcalis*, are amongst the organisms frequently cultured from the stools of young infants with infectious diarrhœa, including those due to, or associated with, parenteral infections, in this country. By contrast, the specific pathogens appear to be more often implicated in some other countries.

EPIDEMIC DIARRHŒA OF THE NEWBORN

At the beginning of the present century between 30 and 40 infants for every 1000 live births were dying of diarrhœal diseases in England and Wales. By 1943 the death rate had been reduced to 4.9 per 1000 (Gale, 1945). The virtual disappearance of summer diarrhœa has been ascribed to the improvement in social conditions, but even where standards of care of the highest order have been maintained, outbreaks of a clinically closely related disease have occurred in nurseries for the newborn in our own day.

These outbreaks, known as epidemic diarrhœa of the newborn, have often been reported since the earlier observations of Barenberg (1936) and Rice (1937) and their associates in the United States, and of Craig (1936) in this country. The signs and symptoms are those of an acute gastro-enteritis with rapidly increasing intoxication. The disease is held by many to be an entity, on the grounds that it is confined to babies in the neonatal period, that it does not follow parenteral infection, the stools being yellow and watery, free from pus and blood and from an identifiable causal organism on culture, and also on the grounds that the course is afebrile, the case fatality rate high, and that there are no characteristic lesions at post-mortem examination. Crawley and her associates (1941) studied exhaustively the intestinal flora in several of these epidemics without finding responsible organisms, and investigations by others have been likewise unsuccessful. Many writers express the belief that a virus will prove to be the causative agent. Limited researches along these lines in this country have been negative (Giles, *et al.*, 1947; Taylor, *et al.*, 1949). But Light and Hodes (1943) and Cummings (1947) in the United States have produced suggestive evidence in favour of a virus etiology.

In recent years epidemics of diarrhœa and vomiting among adults have been reported. Some of these outbreaks have occurred in general hospitals and maternity units (Brown *et al.*, 1945; Cook and Marmion, 1947). The mothers and other adults have been primarily affected and the new-born and older infants secondarily. These epidemics resemble epidemic diarrhœa of the newborn in their mode of spread in the nursery and in the apparent absence of a causal pathogen, but differ in that the symptoms, although comparable, are mild and of short duration and there are no fatalities.

It is clear that diarrhœal epidemics affecting new-born infants may be due to various causes known and unknown, and the same is true of older infants. The unknown causes will doubtless be revealed in time. Speculation on the

possible rôle of variants of *E. coli* as factors in the production of infantile diarrhœa has led to some recent promising investigations.

Giles and Sangster (1947), in a critical study of the coliform organisms, isolated *B. coli neapolitanum* from 94.7 per cent. of cases of gastro-enteritis of undetermined nature, whereas it was isolated in a very small percentage of cases of diarrhœa due to dietetic errors or parenteral infections. The infants were over a month of age as well as under one month. Taylor and her colleagues have isolated a serologically similar strain of *B. coli* ("*Bact. coli* D.433") from the rectal swabs of groups of new-born infants suffering from epidemic diarrhœa as well as from epidemics affecting older babies with diarrhœa in hospitals or nurseries in London and the provinces.

No claim has been made that these strains are the cause of infantile diarrhœa, but it has been suggested (*Brit. med. J.*, 1949, **ii**, 141) that different types of *B. coli* may inhabit the gut in the same way as different types of pneumococci may be found in the throat and bear a similar relationship in their propensities to produce diseases. Thus, some pneumococcal saprophytes—types 6, 19, 23—in the throats of healthy children are facultative pathogens and may cause sporadic cases of broncho-pneumonia, regarded as non-infectious, whereas other epidemic types—1, 2, 5 and 7—not normally found, cause lobar pneumonia, which is communicable. Whether some types of *B. coli* may be responsible for "sporadic" cases of infantile enteritis associated with parenteral infection, and others for epidemic outbreaks, is an interesting possibility.

DIAGNOSIS

An unqualified diagnosis of gastro-enteritis is incomplete and unscientific, for, as has been seen, gastro-enteritis in the neonatal and later months can be due to one of a number of causes, the investigation of which involves a detailed clinical and bacteriological, and often an epidemiological, study. The elucidation of the cause or even the elimination of possible causes may be the indication for correct therapy or point the way to epidemic control.

A few conditions in the neonatal period simulating gastro-enteritis may be mentioned. In "initial diarrhœa of the newborn" the stools are loose, green and slimy and perhaps more numerous towards the end of the second week. Or there may be frequent staining of the napkin due to the expulsion of gas. Vomiting and diarrhœa may be the result of overfeeding, fat intolerance or allergy to milk. Frequent small green stools (starvation stools) may be due to underfeeding. Finally, cystic fibrosis of the pancreas may simulate infectious diarrhœa, as some of the infants affected by the disease have continuous or watery diarrhœa in the neonatal period. The diagnosis may be difficult, but differentiation may be suggested by the intractable nature of diarrhœa.

TREATMENT

The best hope for the permanent reduction of the incidence of gastro-enteritis lies in prophylaxis: the improvement of the living conditions of the affected section of the population and their better education, combined with improved standards of public hygiene. Gastro-enteritis is therefore a

national problem belonging to the domain of the Ministries of Health (and housing) and Education and, to be sure, of the Exchequer.

The establishment of centres designed and equipped for the treatment of gastro-enteritis in different regions is long overdue. Some of the bigger cities are now well served in this respect, but many other places still lack the facilities and staff essential for the best results. A study of the endemic distribution of the disease throughout the country would indicate where treatment centres could be set up to the greatest advantage. Treatment centres should provide individual rooms or, preferably, closed glass cubicles, where each patient could be nursed under a rigid isolation technique. They should be served by a team consisting of a pædiatrician, otologist, bacteriologist, biochemist and health visitor. The resident staff should be skilled in the use of intravenous techniques and should be provided with all necessary equipment.

Gastro-intestinal upsets in neonatal infants, such as those due to feeding errors, and mild degrees of gastro-enteritis associated or unassociated with parenteral infections, are best treated at home. This saves the mother trouble and the baby exposure to infections in hospital out-patient departments. If on the breast, the baby should not be weaned. If already weaned and on a satisfactory milk mixture, this should not be changed, except perhaps to give smaller feeds in a somewhat weaker dilution while there is vomiting, and omitting or reducing the amount of sugar. Boiled water should be offered between the feeds so that the total daily fluid requirement ($2\frac{1}{2}$ to 3 oz. per pound [155 to 185 ml. per kg.] of body weight) should be met. Upper respiratory and ear infections can be treated with small doses of sulphadiazine (0.125 g., four-hourly), or penicillin (30,000 units orally), in water half an hour before each feed. The district nurse may be of great assistance in supervising medication, observing temperature and stools, attending to ears, and the like. Even mild cases must be under frequent medical scrutiny at this early age, as they are liable to deteriorate rapidly. The decision to advise admission to hospital may be quite difficult. Home conditions may be so poor that the practitioner has little choice. He should advise admission if the stools become watery or more frequent and the temperature keeps above 100° F. (37.8° C.), or if the baby begins to look toxic, and certainly on the earliest appearance of dehydration. And he should not delay if there are twitchings or convulsions, restlessness, fullness of the fontanelle or any signs suggesting meningitis, or a blood infection, pyelitis, pneumonia or other serious condition.

The family practitioner would be less often charged with his responsibilities in this connexion if there were less tendency on the part of those concerned to discontinue breast feeding at the first minor intestinal upset. The problems concerning lactation in our modern society are complex, and cannot be resolved by an approach from any one angle, as Waller's (1938) studies have so well shown, but no one will quarrel with the conclusion that the mortality from infantile enteritis would be materially re-

duced if the majority of mothers could breast feed their babies for the first six months of infancy (Cruickshank, 1946).

Chemotherapy.—The hospital treatment of infants with diarrhœa in the neonatal period does not differ from that of older infants, except that for the former the margin of safety is even smaller and the time factor, if possible, more important. Pathogenic organisms, when found, should be tested for sensitivity to the sulphonamides and the antibiotics, but the giving of these drugs must not await laboratory findings. They are often given to infants with enteritis when the bacteriological findings are negative, although their value in such cases is problematical. Various authors have reported on the oral and intramuscular use of streptomycin, which is known to reduce the intestinal gram-negative flora.

From a carefully controlled series Holzel, Martyn and Apter (1949) concluded that whilst clinical improvement with the drug appeared to be more rapid, especially when there was a parenteral infection, it did not exert any specific therapeutic effect. The results are different in septicæmia of the newborn due to intestinal and salmonella organisms. Debré and Mozziconacci (1949) cite the recovery of 12 of 16 young infants given streptomycin orally and intramuscularly. Most had sulphonamides in addition. They were not so successful with their cases of meningitis: only 4 of 25 recovered. Twelve were aged one month or under and all died. They attribute this poor result to the impairment of the circulation of the cerebrospinal fluid from basal arachnoiditis rather than to a difference in the sensitivity of the organisms in the two diseases.

The treatment of *dehydration* is as important as that of any infection that may be present. In milder degrees when there is no vomiting, it may be possible to give the total fluid requirement in the form of $\frac{1}{2}$ or $\frac{1}{3}$ strength saline by mouth. If vomiting is occasional some of the fluid may be given by mouth and the rest subcutaneously, as saline or Hartmann's solution with $2\frac{1}{2}$ per cent. dextrose included. With improvement, oral feeding is resumed, preferably as a half-cream dried milk mixture in gradually increasing strength and quantity. When dehydration is more severe, oral feeding is discontinued for twelve to twenty-four hours, or longer. Plasma should be given initially by vein to overcome the shock-like state resulting from hæmoconcentration and peripheral circulatory failure. Then fluid and electrolytic replacement is made by continuous intravenous drip, employing the above solutions in appropriate amount and concentration. Young, Hallum and McCance (1941) have drawn attention to the danger of giving too much chloride to very young infants, owing to the comparative difficulty of the kidney in excreting it in the early months of life. If too much sodium chloride be given, it may accumulate in the body and produce a chloride acidosis and an irreversible state of œdema dangerous to life. Whole blood may be transfused when the electrolyte and fluid balances have been restored, but some prefer to give blood only when anæmia can be demonstrated.

Darrow (1946) has emphasized the loss of intracellular potassium in severe dehydration as he believes that this loss leads to high mortality, and he advocates its replacement intravenously. However, this treatment is not free from risk, as it may produce heart block and other serious consequences.

It is safer to use potassium only when laboratory control is available.

During recent years *amino-acids* in the form of enzymic digests of casein have been given intravenously to infants with severe gastro-enteritis, with the object of maintaining them in positive nitrogen balance (Hartmann *et al.*, 1944). The value of the measure, which is being increasingly used in this country, has not so far been sufficiently assessed.

For the treatment of dehydration in detail, the reader is referred to the reviews by Hartmann (1947), Govan and Darrow (1946), Henderson (1947) and Alexander (1948).

MEASURES OF CONTROL

The control of epidemics of gastro-enteritis is beyond the scope of this article but a brief reference may be made to epidemic diarrhœa of the newborn. There is no specific therapeutic agent and the treatment is similar to that of infantile diarrhœa in general. Owing to the high morbidity and fatality rates, affected maternity departments and nurseries should refuse admissions as soon as the disease is suspected and close down as soon as it is recognized. The mother and the infant should be sent home and the department re-opened only after it has been cleaned, disinfected and aired.

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THE CARE OF THE SKIN IN THE NEWBORN

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LET there be no rules to substitute for observation and common sense. The question of when to wash the newborn must depend upon the physical condition of the infant. Conservation of heat is of primary importance in the premature and the puny, and any essential cleaning of the skin may be done swiftly but gently with pledgets of cotton-wool and warm olive or arachis oil.

THE EFFECTS OF EXPOSURE

Some infants show their inability to adjust their peripheral circulation to exposure by purple, cold extremities, *acrocyanosis*, or by a coarsely reticular bluish pattern on the limbs which is termed *livedo reticularis*. The latter is usually a manifestation of some impairment of the child's nutrition or the presence of disease, but it may be simulated by a diffuse type of venous hæmangioma, which is generally unilateral. Chilling of the frail infant's skin is a factor in the condition called *sclerema neonatorum*, in which an alteration in the subcutaneous fat leads to the deposition of fatty acid crystals, followed by a granulomatous reaction. The result is apparent as purplish or dark red, indurated areas, most commonly seen over the shoulders, the back, and the buttocks, but they may also be found on the adjacent part of the limbs. Warmth and the inunction of arachis oil are the best methods of treatment, but if the condition is extensive and persistent the prognosis is somewhat grave. Graver still is the so-called *pre-agonic* or *cadaveric induration of the cellulo-adipose tissue of the newborn*, as described by Ballantyne, and although exposure to cold might have been one of the factors in its causation it is essentially associated with grave marasmus and, as its title indicates, is to be regarded as an ante-mortem phenomenon.

WASHING AND CLEANSING

Parents often raise the question of the hardness of the water and its effect upon the skin. The degree of hardness depends upon the amount of calcium and magnesium present, which precipitates soap but is not known to have any harmful effect upon the skin. More soap and more rubbing are necessary to secure the same degree of cleanliness if hard water is used, and so it is advantageous to use clean rain water when this is available. Domestically softened water contains sodium bicarbonate and is likely to remove more of the natural grease from the skin. It is thus less suitable for dry skins than

rain or hard water.

The sturdier infant may be bathed the day after his birth, and there can be no objection to the use of a minimal amount of a bland soap to lather the scalp, body and limbs. It is customary to avoid soap on the face, and the best reason for this is because soap in the eyes is painful and thus likely to make the infant dislike his bath. The plump infant with a hot greasy skin is prone to seborrhœic dermatitis and to grouped comedones on the cheeks, and these tendencies are increased by cleaning with oil. With reasonable care the face can be washed with a trace of soap on a wrung-out flannel or sponge, and observation will determine the value of such cleansing. A greasy skin is also a moist skin, and a moist skin is more susceptible to pyogenic infection, so that washing with soap and water followed by careful drying and the application of a bland dusting powder, with particular attention to the flexures and creases of the body and limbs, is the best prophylactic against infection.

PEMPHIGUS NEONATORUM

A common infection of the newborn is impetigo and, owing to the vulnerability of the skin at this age, it is usually the bullous type known as pemphigus neonatorum, and the causative organism is predominantly the staphylococcus. Blisters arise on inflamed bases and may spread rapidly, usually asymmetrically, and in severe cases cover large areas of the body. In this event the outlook is grave, so that bacteriological examinations of the early bullæ should be made in preparation for penicillin or chemotherapy if the infection cannot be controlled by local measures. The latter usually suffice if instituted early. After culture, the bullæ should be cut away with scissors, the bases cleansed with pledgets of cotton-wool moistened with 1 per cent. sodium sulphate in a 1 in 2000 solution of mercuric chloride, and the lesions dried by applying calamine lotion containing 0.1 per cent. of mercuric chloride. Alternatively, the solution of proflavine followed by the dusting powder of mercurous chloride, bismuth subgallate and talc of the *National Formulary* can be used.

Infection of the intact dry skin from without is exceptional and the appearance of new lesions is suggestive of systemic spread and calls for systemic treatment, as indicated above. An infant with pemphigus neonatorum should be isolated with full precautions against spreading the infection, and if further cases arise, routine swabbings of the noses and throats of doctors, nurses, and parents should be carried out and the necessary measures taken with carriers of pathogenic staphylococci and streptococci. The risk of infection is obviously reduced if masks are invariably worn by those attending the newly born.

Pemphigus neonatorum may be confused with two other diseases: the first is congenital syphilis, which may present bullæ and onychiæ, but the eruption is usually much more polymorphous, and reddish, ham-coloured areas may be present on the trunk, buttocks, or limbs. The infant is often

marasmic, with an enlarged liver and spleen, and serological tests from the infant and the mother confirm the diagnosis.

CONGENITAL AFFECTIONS OF THE SKIN

Epidermolysis bullosa, a congenital anomaly which is characterized by the appearance of bullæ on sites of slight trauma, may be mistaken for pemphigus neonatorum. However, the bases of the lesions are less inflamed and the blisters arise either in the flexures, such as axillæ or groins, or between the fingers, or it soon becomes evident that they are produced by pressure or trivial contusion (fig 1). There is no cure for this disease and the infant requires unusual care and protection. Fortunately some improvement occurs with the passage of time.

Other types of congenital abnormality of the skin present some of the earliest problems in the newborn. A common abnormality is *xeroderma*, or dry skin. This is usually due to a developmental defect resulting in a diminution of sweat and sebaceous glands, and as such is obviously in-

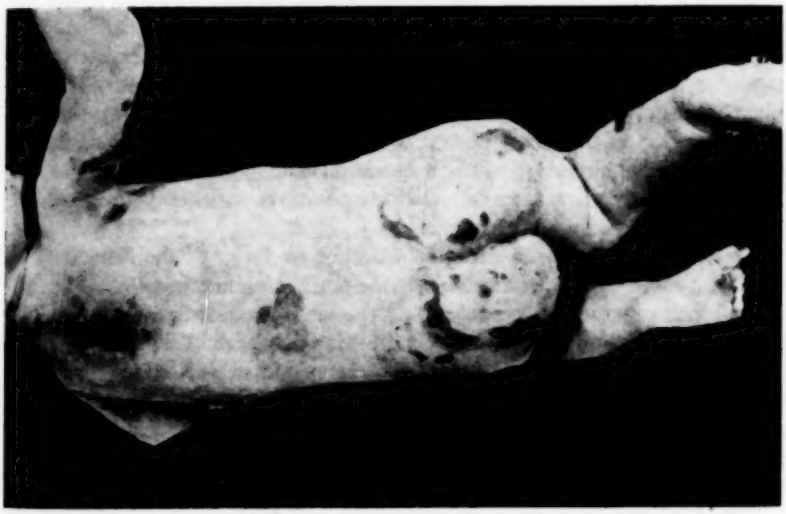

FIG. 1.—A severe type of epidermolysis bullosa in the newborn, simulating pemphigus neonatorum. Large bullæ on pressure areas.

curable. It may be associated with alopecia, partial or complete, various dystrophies of the nails and teeth or eyes, and in severe cases there may be some degree of mental deficiency. This group of anomalies is often described as *ectodermal defects*. Sometimes the dry skin is associated with a marked increase of the horny layer, when the condition is known as *ichthyosis*, and the body may be covered with thick, coarse scaling, often of a dirty brownish colour, resisting attempts at cleansing. As bathing removes some natural grease from the skin, patients with xeroderma and ichthyosis should not be bathed so often, and after a warm bath they require inunction with petroleum jelly

or liquid paraffin, which may be diluted with arachis oil to lessen the greasiness of the mineral oils. Vegetable oils alone are absorbed by the skin and require to be replaced more frequently. Occasionally, xeroderma appears to be associated with deficiencies of vitamin A, iron, or hydrochloric acid, but the developmental defect will obviously not respond to such treatment nor to thyroid extract, although in cold weather the latter, by increasing the activity of what glands are present, will be of some benefit to the very dry skin. When scaling is excessive in ichthyosis, ointments and creams containing 2 to 5 per cent. of salicylic acid will be helpful.

BIRTHMARKS OR NÆVI

The term nævus is loosely used for any type of birthmark to avoid the incongruity of the latter title when applied to marks developing some considerable time after birth. The common types of nævi are usually present at birth or appear quickly in the newborn. *Capillary hæmangiomas* account for the pink, red, or port-wine marks on the face, neck, or on any part of the body. The paler varieties, particularly those occurring on the occiput and in the middle of the forehead, usually disappear within a few months and call for no treatment, but the deeper coloured birthmarks, if not too extensive, might with advantage be treated as early as possible by freezing with CO_2 snow for 20 to 40 seconds with firm pressure, on one occasion only. The skin of the newly born reacts with œdema and some blistering to such treatment, but more is often accomplished by one treatment at this early age than by many later on. Monthly paintings with thorium-X varnish may also be started at an early age.

Cavernous hæmangiomas are bluish, deeper swellings of the skin, with or without a capillary element reddening the surface, and often extend with the rising blood pressure of the infant and the straining associated with coughing, crying, and bowel action. Although it is fairly certain that this increase in size with age merely represents the distension of pre-existing vascular spaces, some authorities believe that the injection of hypertonic saline to produce central coagulation will prevent the growth of the vascular tumour. For this reason expert advice on the growing vascular nævi should undoubtedly be sought early.

Pigmented and hairy moles, if not too large, will require excision and plastic repair and there is no urgency about such treatment. Fleshy moles, dermoid cysts, and small benign tumours of the skin may be noted in the newborn, and if they are not increasing in size may be ignored until the infant has been weaned. A rapidly growing nodule may be a sarcoma, so that surgical intervention is urgent, and the pathologist may be able to advise as to the adequacy or otherwise of the excision.

SCURF AND SEBORRHŒIC DERMATITIS

Many new-born infants present excessive scurfiness of the scalp, which requires softening with arachis oil and then shampooing in the bath with

a bland soap for some days until the head becomes clean. Occasionally this neonatal scaliness resists such simple measures, or a true dandruff is quickly acquired from parents or visitors. An ointment containing 2 per cent. of precipitated sulphur and salicylic acid in an emulsifying base will usually remove dandruff and persistent scales if applied the night before the shampoo. The reaction of an infant's skin to any medicament must, of course, be noted carefully, because if dermatitis is provoked by treatment, eczema may develop. The organisms which are present in scurf, although relatively benign, may produce a mild seborrhœic dermatitis which is very prone to spread behind the ears to the creases of the neck and to the flexures and warm, moist areas of the body. It is essential in the control of seborrhœic dermatitis to secure a clean scalp free from dandruff, and this should be done as described above. A teaspoonful or two of bicarbonate of soda or borax may be added to the infant's bath, and soap used more liberally. After the bath the reddened creases can be treated with calamine lotion containing 1 or 2 per cent. of precipitated sulphur, or an ichthyol-sulphur powder may be shaken into the creases and lightly dusted over the body. If the skin becomes over-dry and cracks, it may be softened by salicylic acid and sulphur ointment.

A pyogenic infection may imitate seborrhœic dermatitis by producing crusted and inflamed intertrigo. This requires cleansing as above, and then the solution of proflavine of the *National Formulary* may be applied to the inflamed creases and followed by the astringent dusting powder, as previously described.

NAPKIN ERUPTIONS

The most common eruption in the napkin area is a contact dermatitis resulting from irritation of the infant's skin by the presence of soap, soap substitutes, or alkali in the napkin. This is a question of nursery hygiene, and so are many other cases of napkin dermatitis which are due to the irritation of soiled napkins. The most severe dermatitis occurs when the urine becomes strongly ammoniacal as a result of the decomposition of urea by organisms from the bowel (fig 2). Treatment is designed to protect the skin with mineral oil, such as liquid paraffin, advantageously preceded by a hardening antiseptic lotion, e.g., the tannic acid lotion of the *National Formulary*.

The napkins after washing may be rinsed in a saturated solution of boric acid or in a solution of mercuric chloride 1:1000 before drying. All these examples of a contact dermatitis affect the curves and most prominent parts of the buttocks and thighs and thus differ from intertrigo, which affects the depths of the creases of the skin.

Intertrigo is a term sometimes reserved for the inflammation resulting from moisture and friction of adjacent folds of skin, the prevention and treatment of which is a matter of hygiene. The term, however, can usefully be qualified by the adjectives pyogenic, seborrhœic, or mycotic, to denote

the infective varieties. The treatment of the first two has already been described. Occasionally, pathogenic yeasts, e.g. *Monilia albicans* and *Monilia pinoyi*, produce somewhat brownish-red, scaly intertrigo, especially of the perianal region, the gluteal cleft, and the perineum. The diagnosis can be confirmed by moistening the scale with liquor potassæ and examining a scraping under the microscope. Subsequently the infant's skin should be cleansed free from alkali. The infant may be found to be suffering from thrush, which calls for treatment, and the skin lesions usually respond to painting twice a day with a watery solution of 1 per cent. gentian violet. It should be remembered that congenital syphilis not infrequently gives rise to brownish-red or ham-coloured eruptions in the napkin area, and these will resist all local therapy until the presence of the systemic disease is recognized and adequately treated.

FIG. 2.—Dermatitis of the napkin area due to ammoniacal urine. The ulcerative type of Jacquet's "dermites infantiles simples".

ECZEMA

Eczema is one of the most feared and troublesome eruptions of infancy and childhood, and in consequence considerable thought should be given to its prevention. If there is a family history of asthma or eczema, extra gentleness in washing the child with a bland superfatted soap is desirable and friction with rough towelling should be avoided. Eczema may be regarded as the eruption peculiar to a hypersensitive skin, which should be protected from every form of provocation. For example, the nurse or mother should wear a thin, smooth cotton apron when tending the infant, because contact of the damp skin with wool or a camel hair dressing gown might be followed by eczema on the sides of the face. Strongly perfumed soaps and toilet powders containing organic substances such as orris, should be avoided, and the nursery should be cleaned with a vacuum cleaner to get rid of allergens in the dust. At the first sign of the eczematous eruption, which consists of grouped minute papulo-vesicles, most commonly occurring on the side of the face but also on the soft flexural surfaces of the body and on the trunk, the plain bath should be modified by the addition of ½ to 1 per cent. Glauber salt. Water undoubtedly acts as an irritant to the broken skin, but this is because the salt concentration of the exposed cells attracts water

and produces distension and damage of the epidermis, with liberation of histamine and other metabolites that profoundly aggravate many types of eczema. The saline bath may be made more emollient by the addition of 1 oz. (28.5 g.) or more of the emulsifying ointment of the *British Pharmacopœia*. This should be creamed with a small quantity of water in a jug and added to the bath, and the milky product is usually well tolerated by the infant with eczema. Many early eczematous eruptions can be controlled by this modification of the bath and the application of a simple calamine lotion or talcum powder, but persistently moist lesions are better treated with a mild antiseptic, such as proflavine solution, to prevent secondary infection.

It is not the purpose of this article to deal more fully with the established diseases of the newborn. Vaccination has so often accounted for the onset of eczema, or has aggravated existing eczema, that it should be deferred in the eczematous infant or in an infant having a marked family history of allergic diseases.

KAPOSI'S VARICELLIFORM ERUPTION

After contact with herpes or a recently vaccinated subject an infant with eczema may suddenly develop on the eczematous areas an eruption of varioliform papules and pustules. This is usually accompanied by fever with temperature up to 105° F. (40.6° C.), and to those unfamiliar with this disease the diagnosis is likely to be a "virulent type of chickenpox or smallpox". Secondary infection produces large areas of what appears to be confluent pyogenic dermatitis, and it is important to control this septic phase quickly with penicillin or a sulphonamide. It has been established that this disease, which is called Kaposi's varicelliform eruption (fig. 3), is a primary virus infection of the eczematous skin. In the majority of cases the virus is that of herpes febrilis, but vaccinial cases are not uncommon.

FIG. 3.—Kaposi's varicelliform eruption in an infant with facial eczema. Showing discrete umbilicated varioliform papulo-pustules on cheeks and the appearances of confluent pyogenic dermatitis on forehead.

INJURIES AND MALFORMATIONS OF THE NEWBORN

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The surgery of the neonatal period provides many problems of interest and, although there are many serious injuries and malformations which will not yield to any form of treatment, it is essential that the practitioner should have some knowledge of those that may be amenable to treatment, for the most important factor making for success is the early recognition of those conditions which require operation for their correction.

Of the birth injuries, the most serious are undoubtedly head injuries, and these should be recognized early so that appropriate treatment can be carried out. Birth fractures of the limbs and nerve lesions, such as brachial paralysis, are usually obvious, and we do not propose to deal with them in this article, as they come within the realms of orthopædic surgery.

The most important congenital malformations occur in the alimentary tract. Many are extremely rare and, in some cases, the necessary treatment is so heroic that recovery is unlikely, but the outlook in even the most serious of these lesions is more hopeful nowadays, and every infant should be given the chance of operative treatment. Many of the malformations which are obvious at birth do not require immediate treatment, e.g. hare lip, cleft palate, some forms of spina bifida, hypospadias, epispadias, ectopia vesicæ, patent vitelline duct, but as most alimentary tract malformations result in obstruction, it is with these that we are primarily concerned. Some of the malformations need not be discussed in detail, as they will invariably be referred for surgical treatment at an early stage. The main lesions we are considering are those associated with a failure of re-canalization of tubular structures, such as congenital stricture of the œsophagus, stenosis and atresia of any part of the entire alimentary tract, and congenital obliteration of the bile ducts. Thus most alimentary tract lesions give rise, in varying degree, to obstruction, and the initial symptom is, as a rule, vomiting. It should be noted that vomiting is relatively common in the first few days of life, particularly after difficult, prolonged and precipitate labours and forceps deliveries, so that lesions which require life-saving operations may not be thought of until too late. It is vital that every baby who vomits persistently (and particularly when the vomited fluid contains bile) should be investigated without delay.

Although the new-born baby tolerates even major operations well, it is important to remember that there are dangers associated with major pro-

cedures which are peculiar to the neonatal period. After birth, the prothrombin level falls rapidly, but returns again to normal about the eighth day. When vomiting has been persistent, there is danger of bleeding, and vitamin K should be administered. Blood loss during an operation should be made good by transfusion, as the total blood volume of the infant is small. It is important, also, during surgical procedures to avoid both chilling and overheating, as young infants, and especially premature babies, have an inefficient heat-regulating mechanism. An oxygen tent incubator may be of value in the pre- and post-operative periods, particularly with the frail, ill baby, and the stomach should invariably be emptied by a stomach tube before the beginning of an abdominal operation. The anæsthetic is on the whole well tolerated, and should be either cyclopropane and oxygen or open ether. Only rarely will a local anæsthetic be suitable.

This article is based on the records of congenital malformations which have been referred to us during the neonatal period in the Surgical Department of the Royal Edinburgh Hospital for Sick Children over a period of about twenty-five years. It should be noted that some of the conditions we are describing have only of late been recognized, and several have until recently been looked upon as inoperable. Consequently, the low figures of such conditions as meconium ileus and congenital obliteration of the bile ducts should not be regarded as representing the actual number of cases occurring in this area. Many of them in the past have undoubtedly died unrecognized or without operation.

ROYAL EDINBURGH HOSPITAL FOR SICK CHILDREN
New Surgical Admissions 1924-1949, 32,000
(age 0-12 years)

Imperforate anus	92, or 1 in 350	admissions
Neonatal obstructions other than volvulus	42, or 1 in 760	,,
Volvulus neonatorum	37, or 1 in 860	,,
Exomphalos	28, or 1 in 1,150	,,
Congenital obliteration of the bile ducts	9, or 1 in 1,530	,, *
Tracheo-œsophageal fistula	15, or 1 in 2,000	,,
Meconium ileus	8, or 1 in 4,000	,,

* Out of 14,000 admissions only.

HEAD INJURIES

The caput succedaneum is a normal finding and is easily distinguished from a cephalhæmatoma, which is limited by the suture lines to one bone. No treatment is required for cephalhæmatoma, which may be mistaken for a fracture of the vault of the skull. Depressed fractures of the skull may follow difficult labours, particularly when there is disproportion, the sacral promontory being the causal agent. Such fractures rarely require operation.

Intracranial hæmorrhage.—Intracranial hæmorrhage accounts for nearly a third of the neonatal deaths and stillbirths. It may follow excessive head moulding in difficult and prolonged labours and the too rapid moulding of precipitate and breech deliveries, but it is also found in premature babies and even in infants delivered by Cæsarean section, so that trauma is not the

only etiological factor. Anoxia of the infant's brain results in severe damage to nerve cells which, along with the lesions of hæmorrhage, is often so diffuse that localization of the lesion may be impossible. It may, however, be possible in the more severe intracranial hæmorrhages to distinguish between those above and those below the tentorium. The results of surgical intervention in such cases are poor, and operations to control superficial bleeding, or to remove blood, can have no effect in lessening the damage to the brain caused by œdema, pressure, hæmorrhage and anoxia.

FIG. 1.—Exomphalos.

The only intracranial lesion for which surgical measures are beneficial is the more chronic subdural hæmorrhage, or hæmatoma. The symptoms are convulsions, vomiting, irritability or stupor, and the signs include pyrexia, exaggerated reflexes and fundal changes. The work of Ingraham and Matson has shown that the diagnosis can be established by tapping through the lateral angle of the fontanelle, or through the coronal suture lateral to the fontanelle. Both sides must be explored, as the lesion is often bilateral. Aspiration is continued on alternate sides daily for a fortnight, and then the clot and membrane are excised, or the clot is cleared out and the inner membrane fragmented to permit expansion of the brain.

ALIMENTARY TRACT AND ABDOMEN

The investigation of the patient includes a careful history to ascertain the salient features of the pregnancy and labour, full details of the vomiting, the taking of feeds, and the passage of meconium and fæces. A full clinical examination of the alimentary and nervous systems may be followed by X-ray investigation in cases of doubt, and when time allows. A straight X-ray may be of value, as the baby has usually swallowed sufficient air for this to be demonstrated. In a complete obstruction, the outline of the distended

proximal gut is often clear enough to establish a diagnosis of the site of the obstruction. The use of an opaque medium requires extreme care, lest it be aspirated or become inspissated, and block the lumen of the gut. Lipiodol given by stomach tube is preferable to barium.

EXOMPHALOS

The diagnosis is obvious (*see* fig. 1). The abdomen should be wrapped in sterile towels and operation must be carried out immediately, before the thin-walled sac can give way or become infected. After excision of the sac, the viscera are reduced, and in small lesions there is little difficulty in closing the abdominal wall, if operation is performed before distension of the gut occurs. The more extensive lesions may present great difficulty, but usually it is possible to reduce the contents and cover them with skin and subcutaneous fat, leaving a ventral hernia to be closed later.

ŒSOPHAGEAL MALFORMATIONS

There may be a simple stenosis or a complete atresia of the œsophagus (fig. 2). In the latter condition, one or both œsophageal loops may communicate with the trachea. Simple stenosis of the œsophagus does not usually cause symptoms until solid food is taken, so that it does not concern us here.

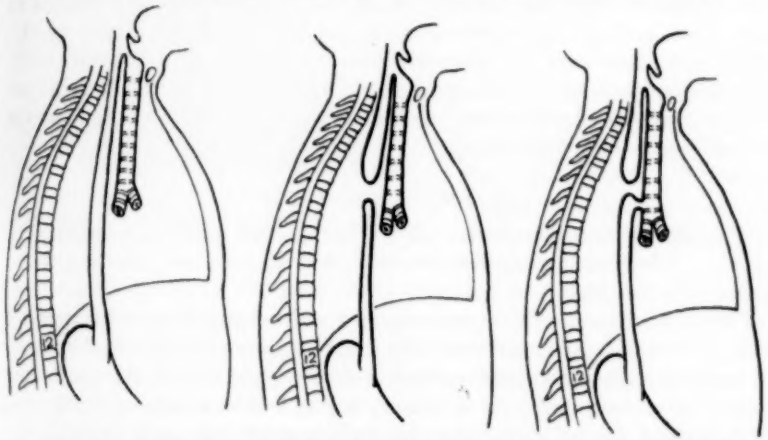

FIG. 2.—(a) Normal œsophagus. (b) Œsophageal atresia (no air in stomach). (c) Œsophageal atresia with tracheo-œsophageal fistula (stomach distended with air).

The most common lesion, occurring in 90 per cent. of congenital malformations of the œsophagus is that in which the upper segment of the œsophagus ends in a blind pouch, whilst the lower portion joins the trachea close to the bifurcation (*see* fig. 2c). The blind upper pouch fills up rapidly and spills over into the air passages. Therefore at or soon after birth, the baby is found to choke repeatedly on its own mucus, and this may be relieved temporarily by aspiration. This state of affairs should suggest the

diagnosis. If, however, the baby is fed, it begins to suck quite well, but chokes almost at once, becomes cyanosed, and brings up the small amount it has taken. No further attempts at feeding should be made. Examination of the chest may reveal moist sounds, or even pneumonia at the right base.

The diagnosis is established by X-ray of the abdomen, when gaseous distension proves the presence of a fistula, and by the passage of a catheter through the mouth, preferably under the X-ray screen. If lipiodol is used, care must be taken to aspirate it after the films have been taken.

Treatment.—The baby is prepared for operation by constant suction of the upper pouch, oxygen therapy, penicillin, and blood transfusion. The lesion is exposed through the thorax, and the fistula is divided after ligature close to the trachea. When technically possible, the upper and lower loops of the œsophagus are then anastomosed. If this is not possible, the stomach is brought up through the diaphragm to be joined to the upper pouch.

Prognosis.—Despite the severity of the operation, a number of survivals have recently been recorded. Operations such as gastrostomy, which were formerly carried out, are of no avail, for unless the tracheo-œsophageal fistula is closed early, death is inevitable.

PYLORIC STENOSIS

This common condition usually causes symptoms about the second or third week of life, and therefore hardly comes within the scope of this article. Pyloric stenosis has, however, been recorded at or shortly after birth, and these early cases require operation without delay, for the infants are intolerant of dehydration; and medical treatment, which entails a longer period of time, is not well borne.

THE SMALL INTESTINE

The *duodenum* may be obstructed by intrinsic or extrinsic causes. The intrinsic lesions are atresia and stenosis, and the extrinsic, obstruction by bands or by volvulus.

The clinical features are persistent bile-stained vomiting, with possible distension of the upper abdomen and, in incomplete obstruction, there may be visible gastric or duodenal peristalsis. In complete atresia, the meconium is small in amount and light in colour, but in duodenal stenosis, following the passage of normal meconium, the stools contain milk curd, and this also occurs in incomplete extrinsic obstruction. X-ray examination by straight film shows gross gastric distension in high lesions, and duodenal distension in lower ones. A "lipiodol meal" may reveal the site of the obstruction (fig. 3). After gastric aspiration and supportive measures, the abdomen is opened, the site of the obstruction located, and the appropriate anastomosis made or adhesions divided. Care must be taken to explore the whole duodenum, as these lesions may be multiple.

Atresia and *stenosis* of the small intestine are more common in the ileum than in the jejunum. The lower the obstruction, the later the onset of

symptoms, and the greater the abdominal distension. Distension, however, may be slight in babies who vomit large amounts. The clinical features are vomiting, distension, constipation, and sometimes visible peristalsis. In the untreated case, symptoms of peritonitis may ensue. The principles of treatment are similar to those of duodenal obstruction. Atresia of the colon is very rare.

FIG. 3.—Duodenal obstruction outlined by lipiodol. Note lipiodol in air passages. It should be given by stomach tube.

VOLVULUS NEONATORUM

This condition is associated with a failure of rotation of the midgut loop, and occurs between the fifth and tenth weeks of fœtal life. As a result of the non-rotation of the developing midgut, there is an abnormal anatomical disposition of the affected segments of the intestine, with the result that at birth the cæcum, which should normally have crossed to the right side of the abdomen and then descended to become anchored to the posterior abdominal wall in the right iliac fossa, is placed free in or near the midline, just below the level of the stomach, and adhesions are usually present anchoring the cæcum to the right side of the posterior abdominal wall. Owing to their position these adhesions result in pressure on the descending part of the duodenum, and consequently some degree of duodenal obstruction is often present.

Associated with the above defect in the position of the midgut, the entire small intestine is found to be suspended from the posterior abdominal wall by a narrow pedicle containing the superior mesenteric vessels and, as a result of undue mobility combined with the narrow pedicle, torsion at the root of the ill-formed mesentery may occur, giving rise to the condition of volvulus neonatorum, so called because it often occurs during the first few days of life. On the other hand, the occurrence of volvulus may be delayed until later childhood, or even until adult life. The volvulus may be partial, and the torsion occur only through about 90°, in which event symptoms may be slight, or the whole small intestine may rotate through

360°, giving rise to a more serious state of affairs. The volvulus almost always takes place in a clockwise direction.

Clinical features.—The infant, apparently healthy at birth, begins to vomit, usually within two or three days. The vomiting is often at first somewhat intermittent, as obstruction is usually incomplete to begin with. It should be noted that the vomited fluid contains bile, demonstrating the fact that the site of the obstruction is below the duodenal papilla. Normal meconium will probably have been passed, and the baby may continue to pass slightly constipated and irregular motions, depending upon the degree of obstruction. The infant does not usually become acutely dehydrated in the early stages, but should the volvulus be progressive and severe, complete obstruction and pressure on the mesenteric vessels will occur, thus resulting in congestion of the small intestine. Later, the changes associated with strangulation will manifest themselves, in that the affected bowel will become distended, and ultimately gangrene and peritonitis may occur. On examination of the abdomen, slight epigastric distension may be noted and, in the more chronic cases, there may be visible peristalsis.

Diagnosis.—The condition should be suspected in infants showing a bilious vomit within the first week of life, particularly when upper abdominal distension is present. A straight X-ray of the abdomen may demonstrate a distended stomach, and relatively collapsed small intestine in the early stages, and malposition of the cæcum may also be evident. It should be remembered that in pyloric stenosis the vomited fluid consists only of gastric contents, and does not contain bile.

Treatment.—Early operation should be carried out if the symptoms persist. On opening the abdomen, the disposition of the parts confirms the diagnosis and, after lifting out the entire midgut loop, it will be seen that a rotation at the root of the mesentery has occurred in a clockwise direction through 90° to 360°. This twisting must be undone, and any associated band of adhesions from the cæcum to the posterior abdominal wall divided. No attempt should be made to place the cæcum in the right iliac fossa, or to anchor it in any way, the division of the adhesions being sufficient to release any obstruction in the duodenum. It is rare for the condition of volvulus to recur after the cæcum has been mobilized as above, but some of these patients do continue to have bouts of vomiting during childhood.

This condition, although rare, is amenable to surgical treatment, and when the blood supply of the intestine has not been seriously affected, the mortality after operation is low.

MECONIUM ILEUS

This is an early and severe manifestation of congenital cystic fibrosis of the pancreas. There is often a family history of death in early life from staphylococcal respiratory infection, or of other children having had the "cœliac syndrome". The obstruction in these cases is due to the blocking of the lower ileum by thick tenacious meconium. The second last loop of the

ileum is grossly distended, whereas the last loop is constricted, and contains balls of inspissated meconium, giving the gut a beaded appearance (fig. 4). The colon is minute, having never had contents, but it is patent, and becomes normal when the obstruction is removed.

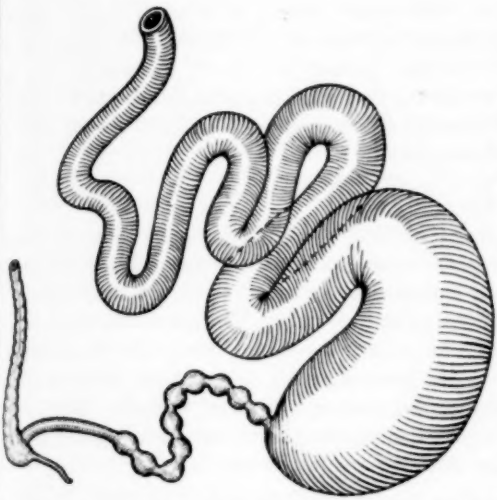

FIG. 4.—Meconium ileus showing distension above beaded terminal ileum and microcolon (after Hiatt and Wilson).

The history of failure to pass meconium, gross distension, and in some cases a family history, make a diagnosis. In milder cases there are obstructive signs, and meconium plugs may be passed, suggesting a diagnosis. Such cases may be relieved by pancreatin, by mouth or rectum, whilst the more severe cases may be relieved by opening the ileum and manually removing the meconium; thereafter pancreatin is given by mouth or duodenal tube.

The prognosis is bad, for although the obstruction can be overcome, the underlying disease is not affected, and the child dies as a rule before the age of ten, despite diet, pancreatin and antibiotics.

IMPERFORATE ANUS

This anomaly presents no difficulty in diagnosis, except in those cases in which the external appearance of the anus is normal. In such a case, failure to pass meconium should lead to an early rectal examination with the little finger in order to establish a diagnosis of atresia. In some cases this malformation is complicated by the presence of a fistula into the urinary tract or vagina. Fistula into the urethra is shown by the passage of meconium per urethram, whilst a bladder fistula produces urine containing meconium. Recto-vaginal fistula is seen on inspection, and does not usually require early treatment. The site of the blind rectal loop may be demonstrated by Wangensteen's method. If the baby is X-rayed in the head down position, the gas and air in the gut rise to the highest level, and serve to outline the limits of the pouch.

Treatment.—When there is a simple membranous occlusion of the anal canal, division of this membrane is sufficient to give complete relief. If the blind rectal loop is close to the anus, it is possible to open it on to the

perineum. When the rectum ends more than an inch or two above the perineum, a permanent colostomy should be carried out: operations which drag such a segment down are followed by fibrous stricture, which defies all later efforts to dilate it, or result in an uncontrolled anus, which is more disabling than a colostomy. Colostomy is the operation of choice in cases in which there is a fistula into the urinary passages. In most cases, a recto-vaginal fistula allows of adequate elimination of fæces, and operation is deferred to a later date. When the opening is narrow, the fistula may be dilated as a preliminary measure. In some cases operation will not be required, as the fistulous opening, which is usually situated practically on the perineum, may be well controlled.

CONGENITAL OBLITERATION OF THE BILE DUCTS

This interesting lesion, first described by John Thomson in 1892, was until recent years considered inoperable, and even now carries a high mortality, not only because of the great technical difficulties involved in operation, but because many cases are anatomically inoperable. The condition consists of a failure of recanalization of some part of the extra-hepatic bile duct system, with the result that there is no communication between the liver and the duodenum. When some part of this tract is connected with the liver, there is at least the possibility of establishing an anastomosis between the patent duct or gall-bladder and the stomach or duodenum.

Clinical features.—The infant is often well nourished at birth, but persistent jaundice is the main characteristic. The jaundice is usually present at birth but may not be marked for some days or weeks. The stools are clay coloured and contain no bile pigment, whilst such pigment is present in the blood plasma and urine. In the early stages the infant's general condition is satisfactory, but within a short period the baby's health deteriorates, feeding difficulties occur, and the abdomen becomes distended, both from enlargement of the liver, which shows progressive cirrhosis, and from the accumulation of ascitic fluid.

The differential diagnosis must be made from icterus neonatorum, which disappears spontaneously in the course of some days, from sepsis with jaundice, from congenital syphilis, and from erythroblastosis fœtalis, which shows a typical blood picture and has an early and high mortality.

Prognosis.—When operation is not attempted, the prognosis is hopeless, although these infants may survive for many months. They are liable to die of intercurrent infection at any time.

Treatment.—Every case of suspected bile duct obliteration or atresia should be explored within the first two or three months of life in order to prevent progressive cirrhosis. On opening the abdomen, the biliary tract must be carefully examined, and if there is any patent lumen containing bile, this must be anastomosed to the stomach or duodenum. The operation is technically difficult, but when successful the infant makes an excellent recovery, although the jaundice is slow to clear up.

NURSERY HYGIENE DURING THE FIRST MONTH OF LIFE

By F. CHARLOTTE NAISH, M.D.

REALIZING that the new-born child differs from all other human types in being without immunity to infection, pædiatricians are more and more concerned with the avoidance and the prevention of infection. If invasion occurs, then, in the absence of any adequate defence, it may penetrate deeply and rapidly, and cause death from septicæmia without first causing those detectable reactions which in the adult are the patient's protection and the doctor's curative opportunity. Therefore invasion must not occur. That is one ideal in pursuit of which practitioners should invade what has too long been considered the nurse's exclusive sphere.

Those who consider it most important that a baby should have a "flying start" in life, and are anxious to maintain regular weight gains at a high level, must also regard as within the doctor's proper sphere any condition which retards growth, although it may not be dangerous and dramatic. A doctor who knows as much and more about the nurse's work as she does herself, makes for more observant and vigilant nursing, even if he should find no definite errors to correct; and usually he will find errors to correct, since many things continue to be taught through unexamined tradition, and will not bear critical examination.

MAINTAINING AN INTACT SKIN

The finest barrier to infection that an infant possesses is an intact skin; and under this general expression I include the mucous membranes lining the mouth and the intestinal tract. Nursery hygiene has therefore to be examined for procedures likely to breach this barrier. There are not a few. The first is the habit of removing vernix with cotton-wool. Cotton-wool is a singularly rough substance, and the skin will be scratched by it. I know of no reason why the vernix should not be left to come off gradually in the warm bath and on the clothes. Screwing bits of cotton-wool into the mouth, nose, and ears, is equally pernicious.

Then there is rough rubbing of the buttocks with turkish-towel napkins after a motion. Quite recently I saw a nurse in a famous maternity hospital holding a baby up by its feet and rubbing a soiled buttock clean with a napkin as she would have scrubbed a floor. By so doing she was both damaging the skin and rubbing in the fæces. The buttocks should be washed with warm water after defæcation, and dried by patting with a soft muslin napkin.

Forcibly stretching the foreskin is another method of breaching the barrier. Provided the baby passes water freely I know of no reason to interfere with the foreskin and, unless the father requests circumcision, I refuse

to touch it under the age of three months. At three months I free with a blunt probe any glans which has an adherent foreskin. They are not common. I have so far seen no ill results from this policy, but nursing staffs continually urge me—I would even say nag at me—to "do something about the foreskin". Like me, they know of no reason for interfering; they differ from me in not requiring one.

Bathing.—Apart from these violent methods, the skin is breached as a result of irritation, mainly by soap, either applied directly to the child or applied indirectly through its clothes and napkins. In this respect, too, much that is deliberately taught is open to criticism. In institutions mothers are taught to continue beyond the eighth day the practice of "topping and tailing", or washing the baby's face and buttocks in the evening instead of giving a second full bath. This makes really adequate rinsing more difficult. Moreover, I find it really more bothersome than giving a second bath—always provided the bath is a good one. As often happens in domestic matters, everything is inter-connected. Baths are commonly too small. They then get cold quickly, and the baby can hurt itself on the edges. If such baths are used, it is not evident that "topping and tailing" makes more work and is less satisfactory. Rubber hammocks are the best type of baby's bath, and I find that those who use them give two baths a day.

Mothers are usually instructed in a method of bathing which is certain to leave soap on the skin. They are taught to lay the baby on a towel across their knees, soap it all over, back and front, and then lift it into the bath to rinse off the soap. (If the mother is not yet experienced and deft, the baby is likely to get too cold during this process.) When it is well rinsed, it is lifted out and dried with the towel on which it was soaped. My observation is that this method does all that could be expected of it; it wipes soap on to a carefully rinsed baby.

Rinsing is the most important factor in the proper *washing of napkins and clothes*, and is the factor most often neglected. Soda and soap-powders should not be used. The modern *detergents*, such as "stergene", can be used with impunity, but not so the *bleaches*, such as "domestos". Whatever is used must be thoroughly rinsed out before drying. In winter, an occasional boiling may be necessary, but so long as the napkins can be dried in the fresh air it is not needed. The importance of correct washing can be indicated by saying that, provided the stools are normal, nine out of ten buttock rashes can be cured by lessons in laundering, and either will not yield to any other treatment, or are found to recur as soon as the unguents used no longer serve to protect the buttocks from the ill-rinsed napkins.

Irritation is occasionally caused by over-liberal *powdering* after illiberal drying. A certain amount of powder is good, as it ensures more perfect dryness than can be secured with a towel; but pouring powder into creases that have been left not damp but wet produces a pudding which may be harmful.

SPECIAL ASPECTS OF ASEPSIS

Strict asepsis is necessary in the care of the cord; but this point is too obvious to be often neglected. Similarly, the avoidance of cracked nipples, which has its aseptic aspect, is usually given attention because they are painful and interfere with the feeding. It is not so common to wash the nipples regularly before feeding, but I believe it should be done.

Errors in the matter of asepsis are common in the *treatment of bottles and teats;* and here again practices are deliberately taught which appear indefensible to common sense and to experience. Glass is smooth. When bottles are subjected to long boiling, especially in districts where the water is hard, they become covered with a deposit which is rough and porous, and in which particles of milk are certain to be retained. The secret of perfectly clean bottles is promptness and scalding. It is well known that if the ordinary domestic milk bottle is emptied at once and immediately filled to the brim with water, it can later be cleaned without any difficulty. Mothers are usually taught to warm the feeding-bottle by standing it in warm water. The moment it is empty, this water should be poured in. Later, the bottle can be cleaned by quick scalding. A bottle brush is not often needed; but one usually has to point out that when it has been used, it too, should be scalded.

It is also taught that teats should be boiled and that they should be kept in water until next wanted. I abandoned this method because it rapidly enlarges the aperture of the teat. Instead, I scald the teat, dry it, put it on a saucer, and turn a cup over it. I have seen no signs of inferior asepsis, and do not expect any; for these quickly scalded teats are too dry for rapid bacterial growth, and are not open to the atmosphere of the room.

MOULDS

A skin invaded by moulds is also open to bacterial invasion. Moreover, when the fungi are in the intestinal tract, their long-continued growth reduces the weight gains, and must therefore be having some constitutional effect.

The most common form is "*scurf*", which shows itself as dirty-looking plaques on the scalp, mainly in the frontal region. It is a strange fact that when inexperienced mothers consult their neighbours about this, they are generally told that it is due to soap, and stop washing the head. This makes the condition rapidly worse. Two things are needed for a cure: a solvent for the greasy plaques and a fungicide to kill the invader. I use mercuric chloride in surgical spirit (2 grains in 4 ounces [0.13 g. in 115 ml.]) with a trace of castor oil. This should be applied once a day, and followed by a soap wash.

Thrush I need not comment upon here, although it can be a serious complaint, because it is well known and I have no new observations to offer. I have seen cases of obstinate *redness of the napkin area* which were resistant to most bactericidal or emollient applications but responded im-

mediately to gentian violet. In one case the condition is known to have followed upon thrush. Such cases have not been numerous enough to justify saying more than that the possibility of moderate fungous infection being more noticeable in the napkin area than in the mouth should be borne in mind.

CROSS-INFECTION

In a hospital where cross-infection among the babies was high, it was markedly reduced by the doctor's examining *every* baby twice a week for signs of early infection. This made the nursing staff do so daily. The beneficial results achieved were due to the earlier application of methods of barrier-nursing, which in themselves had always been fairly efficient. In small babies there are two signs of early infection which should be especially mentioned because, being peculiar to them, they are not always watched for. One is exceptional redness of the mucous membranes of the mouth; the other, redness of the finger tips—as though a whitlow were beginning to develop. These early signs are important, not only for the particular case, but because it is probable that the infection can already, at that early stage, be transmitted by nurses to other infants.

When there is cross-infection, I think there is usually a carrier involved. This has been borne in upon me by the fact that in a home for unmarried mothers and babies, where all the babies sleep in one room, cross-infection has been eliminated by insisting that each mother look after her own child exclusively. In day nurseries, where each nurse has to look after many babies, the same immunity is not the rule. From this it might reasonably be concluded that in nursing homes all artificial and complementary feeding should be done by the mother, as well as breast feeding, and that changing and bathing should be done by her from the earliest moment possible.

FRESH AIR AND CLOTHING

A full-term baby who has been gaining weight for nearly a week can be put out of doors, except in times of fog. The body should be warmly wrapped, special care being taken to see that the abdomen and feet are warm. The head should not be covered, even in frosty weather. A baby thrives if it loses no heat from the skin, but exchanges heat through cold air drawn into the lungs. Babies should not be put to sleep in stuffy bedrooms with other people, especially if the window is closed.

Clothing should be warm but light. A sleeping bag is preferable to a shawl because it keeps the feet warmer. Binders should be discarded as soon as the navel ceases to require a dressing, as they only serve to prevent the child's abdominal muscles from developing.

It seems unlikely that any of the changes advocated will be brought about unless practitioners abandon, entirely and unanimously, the attitude that the hygiene of the infant in the first month is a matter of nursing only.

A PSYCHIATRIST LOOKS AT THE NEWBORN

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THE twentieth century has been called "the century of the child", and it is appropriate that, in 1950, an article with this title should be presented to practitioners of medicine. So much attention is given to the welfare of children by legislators and by the general public, so much interest in the scientific study of child development is shown by psychologists, doctors, teachers, sociologists and anthropologists, that it is difficult to remember that in other cultures and other times the child's position in society was not nearly so important. Among primitive peoples the child's development was moulded along rigid lines. All education was directed towards making him conform to preconceived standards; no one tried to understand him or his needs. He was being trained to assume specific responsibilities towards his parents, the tribe and the gods. A similar attitude can be found in Plato's Republic, for in Greece, as in Rome, the child was trained for citizenship and apparently had little value otherwise. In the Old Testament, emphasis is placed upon the subservience and duty which children owe to their parents and elders. The invitation of Christ "Suffer the little children to come unto me, and forbid them not" went unheeded through the Dark and Middle Ages, until, with the Renaissance, a new interest in the study of the child's needs was born. Educationists and philosophers began to look at him as a distinctive individual, and not merely as a miniature adult. Thus, in the seventeenth century, Comenius advocated that the essential nature of the child should be studied so that his capabilities and methods of dealing with them should be understood; John Locke advised that natural rather than disciplinary methods should be used by teachers; whilst Rousseau, in the next century, urged that the ideal of freedom should be extended from the political to the educational field. From then on we see, as landmarks, the educational reforms of Pestalozzi, Froebel and Herbart, the infant biographies of Darwin, Preyer, Shinn, Dearborn Stern and many others, the child movement of Hall and Sully, the institution of Child Welfare organizations, and the development of Clinics for the study of maladjusted children.

PRESENT-DAY SCIENTIFIC METHODS

In the twentieth century the claims and theories of the earlier reformers and philosophers have been broadly substantiated by scientific studies. The theoretical analysis of child behaviour based upon introspection and recollection of casual observation has been replaced by more accurate methods. The psychometric method, using intelligence, personality, and special-

aptitude tests, grades the behaviour of children by means of standardized procedures. The questionnaire method helps to minimize the unreliability of biographical and autobiographical studies by analysing data obtained from large numbers. Many individual studies have been made using psychoanalytical and play technique methods suggested by Klein (1932), but have been least suited to the investigation of psychopathological data.

Observation of the child, or groups of children, under carefully controlled environmental conditions, has yielded much accurate and valuable information. Watson (1925), Bühler (1930) and Gesell (1932) have been pioneers in this controlled observation method. The psychologist now has methods of reasonable scientific accuracy, ample opportunity and encouragement to study children from various angles, and during the last two decades there has been a great increase in accurate information although, as we shall see later, many misleading conclusions have been drawn from inaccurate and uncontrolled work. So much has been written about the child that, as Hurlock (1942) points out, at times the subject has assumed such importance that it is fair to say that the home and school revolve around it. Perhaps modern man would agree that "of such is the Kingdom of God".

THE PROBLEMS OF PSYCHIATRIC MALADJUSTMENT

Even greater efforts have been made in a successful attempt to improve the material and medical care of the child. Infant mortality and morbidity have been so greatly reduced that many more of those born to-day live to maturity than in any other period of history; childbirth no longer menaces the mother's life as it did, whilst growth and maturation are favoured by improved hygiene and diet. Humanizing influences, ethical and moral movements, and philanthropic legislation have put an end to child sacrifice, child slavery and infanticide, whilst the cruel and callous treatment of children described by Dickens would not for a moment be tolerated in our time. But these advances seem to have made little reduction in the number of children who are born mentally defective, who develop mental illnesses, or who become delinquent or useless citizens. The evils which threaten physical existence have to a large extent been overcome, but the management of factors which affect and shape the personality of the child have still to be understood. Man seems to find it no less difficult than formerly to lead a happy, well-adjusted existence as a human being. Indeed, with the higher standards of psychological and social fitness which are demanded by the rapidly changing conditions of life we can justifiably raise the question whether he is not even less fitted to cope with the problems of life than were his predecessors (Glueck, 1947). A study of the morbidity statistics of the United States and Great Britain shows that about one in twenty of the babies born to-day may spend part of his life in a mental hospital; that more hospital beds are required for the graver forms of mental abnormality than for all other types of disease; that at least a third of those seeking medical advice do so because of complaints which are psychological in origin; that

countless children and adults lead unhappy and inefficient lives because they are maladjusted or emotionally unstable.

If the problem of psychiatric maladjustment appears overwhelming in enlightened and advanced countries like our own, how much more insuperable a task is presented by a country like India. With a population of 350,000,000, there are only some 20,000 mental hospital beds, and some 80 well-trained psychiatrists, whereas India would require a million and a half mental hospital beds, and some twenty thousand psychiatrists to bring her up to a level which we regard as necessary in this country. Obviously this is a task so superhuman and time-consuming that we must turn to some other method of tackling this modern scourge. Surely our efforts should be directed to prevention rather than cure of mental illness. Here we must confess that the more advanced countries have been much at fault. We have spent our energies, our money, and our scientific talent upon the cure of people who have already broken down; we have concentrated our attention upon therapeutic measures which have little chance of achieving even their limited objectives; we have studied the body or the mind in isolation, and the individual bereft of his social and cultural setting; we have ignored the effect produced by the decline of ethical and spiritual forces, and even those economic and industrial changes which have altered almost beyond recognition the meaning and way of life for such a significant section of the population have not been the subject of sufficient inquiry.

THEN AND NOW

It is not surprising, then, that the psychiatrist looking at the newborn should wonder what influences will be his lot for good or ill, towards mental health or disorder, towards stable adaptation or maladjustment. Few of us can comfort ourselves that "God's in his heaven and all's right with the world"; still fewer with a stoic philosophy which would enable us to accept for ourselves and our children whatever fate, blind chance or fortune may bring. If our insecure generation has any belief at all it is that we cannot absolve ourselves from the responsibility of doing what we severally can to make a happy, well-adjusted existence possible for future generations. In pursuance of this end, the psychiatrist must step beyond the bounds of his medical and psychological training in order to cooperate with his colleagues in the fields of social anthropology, sociology, education; he must learn ways of helping parents, health visitors, nurses, lawyers, ministers of religion, managers of labour, industrialists; all those, in short, who influence the development of the child and his adaptation to his environment. This may seem to be stretching the functions of the psychiatrist beyond practical limits. No claim is made that the psychiatrist is influencing such a wide field, nor that he is at present capable of doing so, but that "his future field of research must embrace the psychological, biological and cultural determinants of personality structure" (Ferguson-Rodger, 1949). The principles of mental hygiene, as they affect child development are, however,

well enough known in broad outline for some beginning to be made in the task of counselling and acting as consultant to those who have day-to-day contact with the child in the various stages of his development. In the past, child psychiatrists have too scrupulously avoided giving offence by confining themselves to the treatment of children who were socially, emotionally or mentally maladjusted. Lip-service was paid to the idea that the normal child was in no need of guidance, and was, in fact, better left alone. A more enlightened concept is now being adopted that the theory and practice of child guidance should be applied, indirectly at least, to the healthy, normal child, as well as to the subnormal. This need can be illustrated quite simply. Reference has already been made to the confidence with which the parents in primitive tribes bring up their children. They have in mind a clearly defined, if simple, pattern into which they seek to mould the child. That pattern may be determined by superstition and influenced by unscientific reasoning, but the child may find it easier to conform to, and more adequate in meeting his more important emotional problems and needs, than the patternless upbringing in the modern home. Provided the child of a primitive culture obeyed the accepted rules of parental care and tribal custom, he could feel reasonably secure. What feeling of security can the modern child get when affection is not so much taken for granted as "laid on" with anxious care; what simple approval can he obtain from parents unsure of their own functions and doubtful of their duties towards their family? One can easily believe the story of the psychiatrist who had been giving a lecture to a group of parents upon discipline in the home, and who was asked by a serious father "How do you feel about capital punishment, doctor?" The truth is that until the middle of the nineteenth century children were brought up on the principles of the traditional knowledge unquestioned by popular opinion since the dawn of history. This intuitive knowledge has been assailed by the revolutionary impact of a scientific approach, and so far only a few unrelated and unpalatable scraps from this new source of knowledge have penetrated the thoughts of even the best educated parents. How often, for example, are psychiatrists accused of being the opponents of discipline, and the advocates of a degree of freedom which amounts to licence. And even when an intellectual understanding of such new knowledge is attained, one is still far from an emotional acceptance of it. "How far it is", said Pascal, "from the knowledge to the love of God".

There is another factor which made the prospect for the newborn in a primitive culture more stable. This was the fact that the family, as a primary group, had a more stable relationship with the secondary group of the tribe than the average family has with the modern industrial community. The family knew where it was, and functioned within the tribe according to generally accepted rules; it served a purpose bigger than the immediate self-interest of its members. Now the small egocentric family circle may exist in an industrial city with neither roots nor purpose, neither obligations nor relationships. It may have no consciousness of belonging to any clan

or club, any institution or organization. Without any fixed dwelling it may drift from the sameness of one vast city to another, confused in each by a hurrying mass of people seemingly without discernible order or purpose. A vaguely defined authority apparently does not need or want the family because a house may not be granted even after a wait of ten or more years, and the labour of the father may be only grudgingly accepted. Even in a "Welfare State" this is the fate and experience of many family units. We know from direct observation that when a cultural change of this type takes place rapidly, when industrialization and mechanization break up secondary group relations, it is always followed by an alarming increase in alcoholism, delinquency and mental illness. Further, it has been shown that these effects can largely be avoided if care is taken to preserve the structure of the family and its relationships with the community. It is understandable that this should be so, for as Reeves (1946) states, "A significant fact about human beings is that, for true living, their experience must manifest a recognizable order, in obedience to intelligible laws and purposes, and in the midst of this ordered experience each individual must see his meaning in relation to the whole".

THEORIES OF EARLY TRAINING

So far we may not have seemed to look much at the newborn, but to have emphasized instead the importance of the total cultural situation. Yet the same general conclusion was reached by Orlansky (1949) in his review of some of the empirical data bearing on the theory that various features of infant care determine adult personality. This is one of the most comprehensive and scientific papers which has been written, and should be studied with care by anyone who is in the position to advise mothers about the care of infants. Too much has been written for popular consumption which aggravates rather than relieves the state of painful doubt with which the young mother of to-day faces even the simplest tasks of infant care.

"Analysis of the neonate state [Orlansky declares] has been too much coloured by a naïve reading-in of adult emotions into the infant which is comparable to the anthropomorphizing views of insect behaviour once current among an earlier generation of biologists . . . Especially in psychoanalytic literature it is often stated quite confidently that the child at birth is capable of profound and intense feeling (Jersild, 1946). We agree wholeheartedly with Hendrick's (1942) comment that these descriptions of the neonate represent far more projection of analytic theory and adult passions than scientific observation . . . The best observations we have to date indicate that the new-born infant knows neither anxiety nor confidence, fear nor happiness, but exists in an affectless and presumably consciousless state. Its behaviour is characterized principally by a great amount of undifferentiated mass activity . . . most of its day is spent in sleeping. Efforts to establish a conditioned response in the neonate have met with failure or the most equivocal results".

So when arguments are advanced that many of the experiences of the infant in feeding, weaning, mothering, exercise, sphincter training, contribute to the formation of character, we must not accept them uncritically. Take for example, Schumacher's (1948) statement in a paper read to the American Academy of Pediatrics:—

"Training in cleanliness creates many psychological disturbances. Most parents demand cleanliness much too early; long before the nerve pathways for control have reached the proper maturity. Training in bowel control is often commenced before the child has mastered feeding himself. As a result of simultaneous emotional discomfort at both the oral and anal levels the child may confuse eating and soiling, with the resultant development of strong conflicts producing profound uncertainty and indecision over either act. Fixation at this level of emotional development occurs, and socialization is interfered with".

Schumacher does not tell us how he was able to recognize when an infant was confusing eating and soiling, nor does he disclose any follow-up studies he may have carried out to reach his conclusions that there is a causal relationship between sphincter training and socialization. It is probable that, in common with many other pædiatricians and psychiatrists (cf. Ribble, 1948; Frank, 1939) he is advocating a method of child care which is based upon Freud's (1933) theory that excretory functions are specifically related to certain features of adult personality.

Surprisingly enough, few empirical studies have been made in an attempt to verify a thesis of this importance. Those of Huschka (1942, 1943) and Hamilton (1929) do not provide enough controlled and validated data to prove or disprove Freud's theory, whilst Fries (1946) warns us that a large factor of error would result from "attempting to correlate age at which habit training was started with later personality traits, without consideration of the mother's personality type". Horney (1939) sums up the opposition to Freud's claim that too early and too strict bowel training produces the "anal" traits of cleanliness, orderliness, and parsimony by asserting that "these, like other character traits, arise from the sum total of experiences in the early environment—a person does not have tight lips because of the tenseness of his sphincter, but both are tight because his character trends tend towards one goal—to hold on to what he has, and never to give away anything". Kardiner, too, correlates "anal" character traits with "acquiescence to cultural demands" and speaks of them as a "syndrome of traits being in part historically associated with Protestant virtues".

Orlansky (1949) concludes his review by saying: "We are led to reject the thesis that specific nursery disciplines have a specific, invariant psychological impact upon the child. Instead, it appears that the effect of a particular discipline can be determined only from knowledge of the parental attitudes associated with it, the value which the culture places upon that discipline, the organic constitution of the infant, and the entire socio-cultural situation in which the individual is located. In short, it is contended that personality is not the resultant of instinctual infantile libidinal drives mechanically channelled by parental disciplines, but rather that it is a dynamic product of the interaction of a unique organism undergoing maturation and a unique physical and social environment".

A SUMMING UP

In conclusion, the psychiatrist looking at the newborn finds little of which he can approve in the mass of literature published in academic journals or in the popular press about the needs of infants. The protagonists of this or that method argue, often persuasively and apparently authoritatively, and promise dire future maladjustments if the child is brought up in any other way. Thus, custom and fashion, among middle-class mothers, has shown violent swings in the last few decades, in response, not to scientifically relevated facts, but to theories coloured by the reading-in to the infant of adult emotions. Judgments have been made about adult personality traits and

causative linking with the situations in childhood, or *vice versa*. This is not only scientifically incorrect, but upsetting to parents, and therefore to infants. Insistence on any set of rigid rules for the upbringing of children is likely to have unfortunate consequences, whether these be feeding "by the clock" or "on demand", early and rigid, or late and lenient toilet training. Cultures, customs, parents, infants and environmental conditions vary in their relationships so greatly that it is impossible to lay down any "right" method. The astonishing thing is that parents should be so easily swayed emotionally and so gullible.

I have suggested that the infant in a primitive tribe is probably better off because his parents have never heard any theories which conflict with the principles of traditional knowledge. This should not be taken to mean that I advocate a return to primitive custom, even if that were possible. My plea is that the psychiatrist should do what he can towards contradicting unsubstantiated theories and methods, should encourage parents to love and enjoy their children, should relieve their anxieties, and should advise them to trust to their intuition, to their common sense, and to doing what seems to them to be right and reasonable in the circumstances. The one thing we can be sure of is that if the parents give the child a feeling of security, abundant affection, confident discipline, and reasonable freedom of expression, he will suffer no major psychological trauma that can be attributed to mismanagement on the part of his parents. To know this would free parents from doubts and needless self-reproach.

Meanwhile, the psychiatrist himself should cooperate with his colleagues in other fields, in careful research into the psychological, biological and cultural determinants of personality structure.

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THE RESPONSIBILITY OF MODERN MEDICINE

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Any intelligent layman, if asked to mention some of the advances in medicine of the last twenty-five years, could no doubt name a good many of them. He would, of course, mention insulin and the liver treatment of pernicious anæmia, some gains in endocrine therapy and in our knowledge of vitamins. Then he would go on to the sulphonamides, penicillin, and probably streptomycin, and if he were fairly knowledgeable or travelled would no doubt mention some of the conquests of tropical disease. The more thoughtful type of layman would realize that surgery has made great strides at the same time, and that operations are now being performed which would have been impossible even ten or fifteen years ago. It should be noted that all these advances are in the field of therapy, for that is what appeals to the layman, and it is after all the ultimate object of medicine to restore people to health. If you asked a doctor the same question I think that in most cases you would get a similar recital. Only very few would tell you that some of the greatest gains in the last quarter of a century have been not in therapeutics but in diagnosis, and that in many cases it is only by using methods of precision in diagnosis that new remedies can intelligently be applied. If I were asked what in my opinion was the main difference between medical practice to-day and thirty years ago, my first answer would be "the responsibility has increased a hundredfold". The main purpose of this article is to point out that these great gains in medical knowledge demand an entirely new outlook on medicine, a new approach to practice. Merely to add penicillin and sulphamezathine to the bottles already existing in the dispensary is to misinterpret the whole meaning and nature of this revolution in medicine. The practitioner must fully realize his new responsibilities and the need for an accuracy in diagnosis which was never required before. He must acquire a new understanding of the processes of disease in order to apply his remedies intelligently. These new weapons are powerful and dangerous, and the routine prescriber, who was safe enough with his stomachics and his expectorant mixtures, is not to be trusted with them.

I qualified in 1921, at a time when micro-chemical methods were beginning to be adopted as a routine procedure in medical diagnosis. We looked upon these new methods as new aids to diagnosis, just as the ophthalmoscope and the sphygmomanometer had been in their time, but actually they were something far more. They were the beginning of a change in medical thinking, from the structural to the functional; the end of the era

dominated by anatomy and the great German pathologists, and the beginning of the new medicine based on the physiological discoveries of the beginning of this century. Naturally we often failed to understand our new methods; like the people in the Bible we looked for a sign. We still thought in terms of diseases and asked whether a high blood urea was always a sign of chronic nephritis. To-day we know that such a question is meaningless, for we interpret the blood urea in terms of nitrogen metabolism and glomerular filtration rate. As these methods became more and more applied to the study of pathological function, physiologists found that there was a great deal to be discovered from nature's experiments in the human subject which could not be learnt under the conditions of the physiological laboratory, and many of the physiological advances of recent years have started in the medical wards. Pernicious anæmia is an excellent example of this interchange between medicine and physiology. The discovery that liver might be an important factor in blood formation was originally a physiological one, but when it was found to be a "cure" for pernicious anæmia this initiated a new advance in the study of the physiology of blood formation. Medicine, in fact, now probably contributes as much to physiology as physiology does to medicine, although no one would attempt to assess their relative importance. Thus there has come a change of emphasis, a change of understanding, a change of the centre of interest. Although we do not ignore the underlying pathology we tend to think, for instance, more in terms of congestive heart failure than in terms of mitral stenosis; we are often content to discuss syndromes rather than diseases.

THE RESPONSIBILITY OF EXACT DIAGNOSIS

My main thesis, however, is the greatly increased responsibility which this new knowledge entails. Take, for instance, a child at the onset of cerebrospinal meningitis in the days before sulphonamides or penicillin. The doctor would see the child on the first day, prescribe a simple febrifuge and call again tomorrow. The next day he might begin to have his suspicions, but he could safely wait another day or two to make sure before breaking the serious news to the parents that the child was suffering from meningitis. No harm was done because there was no efficient remedy. To-day all that is altered. Undue delay in diagnosis amounts to serious negligence. Diagnosis, moreover, must be much more accurate. Conditions react to penicillin which will not respond to sulphonamides. For others again, streptomycin is the specific remedy. Not only do these principles apply to acute disease; accurate diagnosis is always essential when powerful and specific remedies are to be used. Sometimes the doctor has to ask himself "how long am I entitled to wait for a diagnosis before applying treatment?" The answer will obviously depend upon the urgency and seriousness of the symptoms and the likelihood of treatment being effective. It is nearly always a mistake to rush in before major diagnostic steps have been taken, even if one does

not wait for the reports. In a case of acute dysenteric diarrhœa, for instance, it is possible to send a stool to the laboratory although one may then decide to administer sulphaguanidine before waiting for the bacteriological result. In general practice, temptations to treat without sufficient knowledge are many, but if they are yielded to they usually result in disservice to the patient. You may see a middle-aged man who is obviously anæmic. You may decide to try injections of liver for a few weeks before deciding whether or not to send him to hospital for a diagnosis. This can only have one of two results: if the treatment is successful, sooner or later you will have to answer the patient's question "Must I continue with liver injections for the rest of my life?" You have not the evidence on which that question can be answered, and by your treatment, however efficient, you have destroyed the only evidence on which the diagnosis could have been made. All that you can do is to withdraw ignominiously, withhold treatment, and wait for a relapse. Or the treatment may not be successful and you have wasted a month, and the carcinoma of the bowel or stomach has advanced accordingly.

Great surgical advances, too, although they are not the chief theme of my discourse, require a much finer precision in diagnosis than we have ever attempted before. A surgeon does not operate upon the heart or lungs without very exact information as to the condition which will be found. And so the borderline between medicine and surgery is less defined than it has ever been, and in many cases it is quite the custom for a patient to be investigated by the physician and handed over to the surgeon at the right time for his operation, often to be returned to the physician afterwards for further treatment. I could quote numerous instances of this medico-chirurgical collaboration, but it will be sufficient to mention the surgery of the brain, of the chest, of the stomach, and of the endocrine glands.

THE DOCTOR'S RESPONSIBILITY TO HIS PATIENT

Our responsibility to our patients does not end, however, with diagnosis and treatment. I would like to see doctors take far more trouble and care in the advice which they give to their patients. It is a fact beyond any doubt whatever that in the great majority of cases, probably more than 95 per cent., we can by modern methods arrive at a correct diagnosis and a fairly accurate prognosis. I realize that in difficult cases this accuracy can only be reached in first-rate hospitals with every facility for investigation, but it is the doctor's business to know when investigation of this kind is required and to see that his patient has the benefit of it. I would be content indeed if I felt that this article had the effect of breaking down to some degree what I call the authoritarian school of medical practice. Unfortunately such cases as the following are by no means unusual.

A woman of forty complained of tiredness, loss of energy, and shortness of breath. She was an intelligent person who gave her story quite clearly, and she was

sure that at rest in bed, even lying flat, she was never short of breath at all, and that the dyspnœa was purely related to exertion. It therefore could not have been cardiac in origin and was likely to be caused by anæmia. Nevertheless, her doctor, perhaps quite wisely, sent her to a tuberculosis department to have her chest X-rayed. This was negative, and a month or two later, as she was making no progress, she was sent to me as a probable case of anæmia. Her blood count showed that this was the correct diagnosis and that the anæmia was of the iron-deficiency type. I asked her what her occupation was. She was an unmarried woman and she said that she had been a canvassing agent, and I said "What do you do now?". She said "Nothing, I had to give up my work". I said "Why did you do that?" and she said "Because the doctor said that cycling was not good for my breathing". Now it is not always wise to take patients' statements as gospel truth, but this was an intelligent woman whose living depended upon a job which required her to cycle for considerable distances and I do not think she would lightly have given it up. No doubt she realized that in her present state it was impossible to carry on, and so she took the doctor's advice without further question. In my opinion the advice given to her can only be described as irresponsible and mischievous. Here was a woman who after the simplest of investigations could be cured by the simplest of treatment, but acting on the advice of a medical man she has given up a job which she has held for many years and upon which her livelihood depended.

I could unfortunately quote many other instances: people who have been kept on restricted diets because of an attack of acute nephritis from which they have long since made a complete recovery; people who have been kept away from work for weeks on account of cardiac symptoms which are really psychogenic. Those who belong to the authoritarian school of medicine seem to be unable to resist the temptation of restricting their patients' lives in one way or another. They must give some instructions, however meddlesome; they must give some treatment, however unnecessary. My point is that we are no longer living in the days when we had to try something and hope for the best. We are now living in the days when the answer, in a great majority of cases, is known or can be found, and there is no excuse for giving ignorant and irresponsible advice.

THE NEED FOR INTELLECTUAL HONESTY

There is still another way in which the customs and traditions of medical practice have not kept pace with medical discoveries. In the old days, when we could treat practically nothing, we tried to treat everything. Perhaps it was necessary then to keep up our own morale and that of our patients. But to-day there are so many things which we can treat and understand that we should be far more honest about our limitations. We should frankly admit to ourselves and our patients that a large number of bottles of medicine are quite useless, and we should cease to prescribe them. I am sure that in many cases the patient in this respect is far ahead of his doctor and is quite willing and ready to hear that in his particular case medicine will be of no service and that treatment consists, for instance, in rearranging his mode of life so as to live with, and in spite of, his disability. Frequently advice of this kind, especially if it can be combined with reassurance, sends the patient away contented and understanding, relieved of the anxiety state which

caused perhaps two-thirds of his symptoms. It has the further advantage that the patient does not need to return to the doctor week after week.

MEDICAL EDUCATION

I have been critical of some of the defects which I think are often to be found in practitioners. I will conclude by a criticism of medical education. The great speed of advance in medicine over the last twenty or thirty years, and the complex nature of diagnosis and treatment in many cases have made difficulties for us all. This has led inevitably to specialization, for it is quite impossible nowadays for one man to be an expert, for instance, in the interpretation of electrocardiograms and in the examination of the sternal marrow and the investigation of diseases of the lungs. It is natural that the greatest authorities on any particular branch of medicine or surgery have tended to gather together in the big medical schools, and this, too, is inevitable, and indeed desirable, for the University schools of medicine should be the centres of learning and research as well as of teaching and hospital practice; but it has had the effect of making the training of the medical student more and more artificial. The type of work and the type of case which he sees in his teaching hospital become more and more remote from the type of case with which he will have to deal when he goes out into practice. I have said elsewhere, and I repeat it without hesitation, that I consider that one of the ways in which a solution to this problem can be found is by the establishment of University Health Centres where students will see a group of the very best general practitioners at work. It is right that students should see the modern methods of diagnosis and treatment in hospital in the hands of experts, but it is quite wrong that they should see nothing else and that they should have no training which will fit them for general practice and give them the ambition to be practitioners of the highest standard. General practice is still a very great art. In spite of all modern methods, diagnosis still rests, in the first instance, on accurate history taking, and the biggest difference between a good doctor and a bad one is the way in which he takes a history. But at the present time there is no one to teach general practice; there is no one to set a standard for general practice; there is no place where a practitioner can come and see what are the current trends in modern general practice. It is time that we remedied this very serious flaw in medical education.

CURRENT THERAPEUTICS

XXV.—RADIOACTIVE ISOTOPES

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THE twentieth century may, if mankind survives, become known in history as the beginning of the atomic age. What many, misled by articles in the popular press, fail to realize, however, is that the dawn of this atomic age was not in 1942 with the development of the first atomic pile, nor in 1945 with the bursting of the first atomic bomb. These revolutionary instruments came after nearly half a century's progress in atomic physics. Similarly, when the general medical profession is loosely told of the enormous therapeutic benefits that will accrue from the ready availability of radioactive isotopes produced in this new atomic age by atomic piles and cyclotrons, it is worth while to pause to consider the true state of affairs.

These radioactive isotopes have that extra something which stable isotopes lack, namely an instability of the nucleus that results in spontaneous disintegration of the atomic nucleus with the liberation of energy. The energy may be released as an α particle (i.e., a positively charged helium nucleus), as a β particle (i.e., an electron, usually a negatively charged electron), or as a γ-ray or X-ray. The therapeutic possibilities lie in the destructive effect of this energy when liberated in tissue. There is no evidence as yet that this form of energy has anything but a destructive effect. Each of these emissions —α, β, γ and X—has an ionizing effect. The charged particles (α,β) in their passage through tissue remove electrons from the molecules which they strike in their path, so that these become ions. The X- and γ-rays have a similar effect, in that quanta of these rays are absorbed in the tissue and liberate secondary electrons which exert the ionizing effect.

X-rays have been known for half a century and have been widely used in therapy ever since Röntgen originally discovered them. Naturally, radioactive substances have also been known for half a century. Becquerel described the properties of uranium in 1895, and the Curies that of radium in 1898. "Radium" in particular has been used for therapy. The γ-rays of its decay products have been wisely used like X-rays for their penetrating destructive effect; less wise was the early use of draughts and injections of radium and its decay products for a miscellany of conditions—neoplasms, reticulo-endothelioses, diabetes.

X-RAYS AND γ-RAYS

After fifty years of experiment, radiologists have rationalized and increasingly perfected the technique of radiotherapy for malignant and hyperplastic states. In general what is desired, say, in the case of a malignant new growth,

is complete destruction of the abnormal cells with minimal destruction and damage of normal cells. If the growth is superficial, for example on the lip, the X-rays can be trained directly on to the growth, or "radium" needles can be inserted directly into it. The maximum destructive effect is obtained at the site, but some of the penetrating radiations also affect the deeper-lying tissues. When the growth is deeper, a surgical approach can be made and "radium" needles inserted as before, or again, X-rays or γ-rays from a "radium" bomb can be brought to bear on it. The difficulty in this latter case is that the normal tissues superficial to the growth, especially the skin, may be damaged irreparably in the process. Radiological technique helps to overcome this. The X-rays originally produced at low electrical potential were of longer wave length and less penetrating than those now capable of being produced at higher potentials. The harder the rays the less rapid is the degree of absorption at superficial levels. Thus with modern high voltage machines, or with the "radium" bomb which emits hard γ-rays, deep penetration is possible without undue damage to the overlying tissues. But to get a sufficient dose of these rays at a considerable depth, multiple beams from different directions have to be used, so that they cross at the target area. X-ray therapy is at the moment mainly carried out with machines working at 200 to 250 kilovolts, which give a depth dose at 10 cm., about ⅓ of the skin dose. Machines have been developed, and in places are in routine use, which will operate at 1 to 2 million volts. Here the depth dose is somewhat greater and the skin tolerance is also higher. Supervoltage machines, betatrons, synchrotrons and linear accelerators are at present being tried in experimental units for use at tens and even hundreds of million-volts. Somewhere there is an optimal voltage for external therapy, but this has not been reached in practice, although estimates can be made from theory.

In all these methods of application of external irradiation there are, amongst others, the complications of: (a) doing unwanted damage to normal tissue; (b) not being able accurately to define and therefore irradiate with lethal doses all the tumour cells, both in the primary growth and in any metastases; (c) the varying sensitivities of the respective normal tissues traversed by the irradiations; (d) the varying sensitivity of individual neoplasms. Ideally what is required is a substance which, administered by injection or through intestinal absorption, will be wholly localized in the tissue it is wished to destroy. If this substance is itself radioactive, or can be bombarded to make it radioactive, the ionizing destructive radiations will be liberated locally. If the radiations are non-penetrating they will not affect the tissues remote from their source and only slightly those in the immediate neighbourhood.

α-AND β-RAYS

The X-rays and γ-rays have ranges of many metres in air and, depending upon their wave length and energy, from centimetres to metres in tissue.

Therefore, as an internal source of destructive irradiation, they are far from the ideal. β-rays, or electron particles, on the other hand, have a much shorter path in tissue, the exact range depending upon their energy but varying from microns to millimetres. α-rays, or the helium nuclear particles, have, compared with β particles, a very much greater mass (x 7,500), and as they are liberated with an energy of some millions of electron volts, they have an intensely local ionizing effect in their ranges of some 20 to 80μ. For specific ionization, that is, the amount of ionization produced per unit length of path, there is therefore no missile to touch the α particle. To be effective as a destructive agent it must be liberated right inside the tissue to be destroyed. As irradiation applied from the outside it would have extremely limited value, as the cornified layers of the skin would in most cases be thick enough to absorb all the energy. Atomic physics has given us, for external bombardment, weapons of nearly as high a specifically ionizing effect in fast neutrons and protons, these being respectively the uncharged and the positively charged building blocks which make up the various nuclei of different atoms. Radiotherapists hope eventually to be able to make valuable uses of these radiations produced by atomic piles and cyclotrons, but the day is not yet, and anyway they suffer from many of the complications enumerated under the discussion of the use of external X- and γ-radiations, together with others specific to themselves.

To return to the ideal postulated above: α particles liberated in all the malignant cells but not in any of the normal cells of a cancer patient would be, given accurate judgment of dosage, a highly effective means of treatment. The difficulty arises in how to get the α particles there. Broadly speaking, only the naturally occurring radioactive elements emit α particles. In fifty years of knowledge of naturally radioactive elements no one has succeeded in solving the problem. The crude methods of administering radium which emits an α particle, or some of its decay products, e.g. radon, which also emit α particles, were unsuccessful. Moreover, they led to unwanted complications. In those patients who did not die of the complaints for which they were treated, the radium localized, as does calcium, a chemical analogue, in bone. There the bombardment by α particles produced bone necrosis, aplasia of the bone marrow and osteosarcoma.

RADIOACTIVE IODINE (I^{131})

The artificially produced radioactive elements are mostly not emitters of α particles but of β particles or of γ- or X-rays, or both. The emitters of β particles, it was thought, might be a useful alternative to α emitters as their effects would be reasonably local. The difficulty again, however, is in what form to administer the radioactive isotopes. The materials are produced at source usually as inorganic salts or compounds. Apart from its mineral needs, however, the body seems to have little use for inorganic compounds. The thyroid seems to be unique in this respect. It derives its essential iodine from the inorganic iodide of the diet and builds it up to thyroxine.

Thus radioactive iodine administered as iodide will largely be taken up by the thyroid. While it remains there undergoing synthesis it will by decay be liberating its energy. Among many possible radioactive isotopes of iodine, I^{131} is usually selected. It is relatively easily available; it has a half-life of eight days; it has β-ray emissions of useful energy, and also emits a γ-ray. For therapy the β-rays would be the effective agent; for tracer investigational work the γ-ray is of great value, as it allows the iodine to be tracked by counters outside the body.

I^{131} has been used experimentally for the treatment of thyroid disorders, notably carcinoma of the thyroid and hyperthyroidism. *Carcinoma of the thyroid* is a relatively rare condition. Two functionally distinct types are recognizable—those in which the cells respectively do and do not retain the capacity to select inorganic iodide from the blood stream. Obviously the latter and more common type is not immediately amenable to treatment by radioactive iodine in inorganic form. However, Seidlin (1948) suggests that complete thyroidectomy by surgery or by irradiation may induce non-functioning metastases subsequently to take up iodide. These cases then, like the minority which do immediately select iodide, are amenable to treatment with therapeutic doses of radioactive iodine (~100 mc.). Of 10 patients treated with I^{130} or I^{131} since 1943, Seidlin has had five improved, including one five-year cure.

Because of the rarity of carcinoma of the thyroid, radioactive iodine, if it were of value only in this condition, would have a small place in therapy. *Hyperthyroidism* is, on the other hand, a common condition, and for nearly ten years experimental treatment by radioactive iodine has been carried out. The principle of causing regression of the hyperplasia of the thyroid tissue by ionizing radiations is not new. External X- and γ-ray treatment has been used for over forty years. After a period in which the treatment had a vogue, it fell generally into disfavour for two main reasons. The surgical operation of subtotal thyroidectomy became perfected and is now in skilled hands a procedure with a very low mortality; the end-results are also satisfactory. Secondly, the discovery of goitrogenic drugs, such as the thioureylenes and aminothiazole, has allowed a relatively safe and satisfactory alternative to surgery. The points to be decided from experimental clinical trials with radioactive iodine are therefore:—

(1) Does this treatment carry a lower mortality than with existing methods? This is unlikely, as mortality is now extremely low and very large numbers of cases treated would be required to show significant differences.

(2) Is it safer than existing treatments? Time, and a long time too, will alone show this, since the complications to be expected from surgery and goitrogenic drugs are usually immediate or only a little delayed, whereas the complications from radioactivity are, we know from experience, often latent for ten, twenty, and even more years.

(3) Is it more, or less, effective than existing treatments? Even now this question cannot be answered.

The difficulties have been mainly associated with dosage. Quimby (1948) states that there are three problems: (a) the volume or mass of tissue involved; (b) the amount of radio-iodine taken up therein; and (c) its biological half life. (b) and (c) can be derived by experience and measurement, but the estimation of the volume of the thyroid is always a clinical guess which, even in the case of specialists, is very fallible. The effective single dose of I^{131} seems, according to Chapman (1948), to be about 0.2 mc/g. of thyroid, but the standardization of the I^{131} millicure is difficult and the amount dispensed as such by various laboratories has been different by a factor up to 2. This is on account of ignorance among physicists of the exact disintegration scheme of the atom. For routine treatment of the hyperthyroid patient there is therefore not yet a place for radio-iodine. In experimental clinics its powers must continue to be evaluated. Such clinics with their expensive electronic equipment must in particular attempt to confirm the claim of Werner *et al.* (1948) of considerable success (89 per cent. remissions) in cases relapsing after surgery.

RADIOACTIVE PHOSPHORUS (P^{32})

The other β emitter besides iodine which has been extensively investigated as a therapeutic agent is phosphorus. This has usually been as inorganic phosphate, which is administered by mouth if dispensed as a potassium salt or intravenously if as a sodium salt. The rationale behind the use of such radioactive phosphate is that inorganic phosphate is taken up mainly by cells in active division, as phosphate is an essential constituent of nucleoprotein. Thus it will be selected by those parts of the body which normally are mitotically active—the bone marrow, the testes, the intestinal tract and the skin. The bone also contains large amounts of phosphate as a complex apatite. The bone is not metabolically active but ion-exchange between bone and plasma readily occurs: this is usually an unwanted complication. In hyperplasias, e.g., of the bone marrow or reticulo-endothelial system, and in malignant new growths, the demand for phosphate is large. If it is large enough, these tissues can take up enough radioactive phosphate to cause regression of the growth of the tissue.

In practice, as has been shown by numerous investigators, e.g. Lawrence (1948) and Hall (1948), *polycythæmia rubra vera* responds dramatically to treatment with P^{32}. Not only is the erythrocytosis diminished but the leucocytosis and thrombocytosis equally so (Doan *et al.*, 1947). With careful management it would seem that in these cases the prognosis can be almost as good as that of a normal person of like years; for these patients are mostly elderly. And in this lies one of the safeguards. Radioactive phosphate deposited in bone, particularly in repeated doses, might be expected in time to be carcinogenic and cause osteosarcoma, as does the much longer lived radium. But the latent period will be long—longer than the expectation of life of an elderly person. Secondly, an appreciable amount of the radioactive phosphate will go to the gonads and there cause damage to the germ plasm,

which might manifest itself as impaired fertility or as dominant or recessive mutations of greater or less importance in the offspring. Thus there is much to be said for restricting therapeutic use of radioactive isotopes in persons with disease not immediately lethal, to those over the age of the menopause.

Whereas the results in polycythæmia vera are clinically very satisfactory, in the *leukæmias* and *reticulo-endothelioses*, such as Hodgkin's disease, they are disappointing. Opinion is fairly general that radioactive phosphate has little advantage over X-ray therapy in the chronic conditions, except in those instances when deep X-ray therapy is complicated by undesirable "radiation sickness". In these cases the radiation sickness is usually not elicited by the isotope treatment, but the method gives palliation, and not cure, of the primary disease. In acute leukæmias, radiophosphorus, like X-ray therapy, is useless (Reinhard *et al.*, 1946).

Where radiophosphorus does seem to have a great future is in superficial radiotherapy. True, X-ray therapy has in the past proved satisfactory for *superficial neoplasms*. The X-rays, however, often penetrate deeper than is necessary, and a high energy β-ray source has many advantages (Low-Beer, 1947). It would have a place, not only in the treatment of neoplasms but for such dermatological practices as epilation for tinea of the scalp.

Radioactive phosphate in insoluble form, e.g. colloidal chromic phosphate, has been used for experimental irradiation of mouse tumours by infiltration (Allen *et al.*, 1945). Other radioactive substances of long or short half-life have been suggested for similar clinical use. In all these cases, however, one is merely employing not the old tools of the X-ray tube and radium and radon, but new ones, to produce the same physical result—the irradiation of unwanted tissue from external sources. The goal will not be reached until the unwanted tissues can be made to absorb the radioactive materials with really high selectivity. It is hoped that organic substances will be found that are selectively taken up by malignant cells. These organic substances could then be synthesized with C^{14} or H^3, both of which emit β particles of very low energy and therefore of short range. Having done their destructive work, it is then hoped that these unpleasantly long-lived isotopes will be excreted as water and CO_2. Obviously it will be a very long time, if ever, before this ideal can be translated into fact.

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REVISION CORNER

GYNÆCOMASTIA

ENLARGEMENTS of the male breast are divided into two types: true, when there is an increase of breast tissue, and false, when fat or other tissue collects in the mammary region so as to appear like breasts. It is an embarrassing matter for a man if he appears to have the chest of a woman, and the main importance of the condition from the patient's point of view is its appearance; from the physician's point of view it is also important because it may be the manifestation of serious endocrine disease.

False gynæcomastia can occur with ordinary idiopathic or familial obesity and is unattractively common on the bathing beach. The obesity of eunuchoidism is especially prone to produce false gynæcomastia. Rarely the male breast may be the site of a tumour, and adenomas, lipomas, and carcinomas are thus rare causes of false gynæcomastia.

FIG. 1.—Gynæcomastia in a boy aged eighteen. (Dr. D. G. Ferriman's case)

True gynæcomastia.—The endocrinology of gynæcomastia is not completely understood. Most cases seem to be produced either by an increase of œstrogens or a diminution of androgens, the important factor being the œstrogen-androgen ratio (Glass and Bergman, 1938). In true gynæcomastia the breast tissue is histologically indistinguishable from normal female breast tissue, and when some secretion is present the appearance resembles an ordinary lactating breast.

PHYSIOLOGY

Recorded cases of males suckling children at the breast with or without initial gynæcomastia are common in old medical literature, but probably not much more common than are recorded cases of sea serpents. Gould and Pyle (1898) have collected a touching assortment of bereaved husbands, ships' captains and devoted slaves who have suckled infants at their breasts owing to emergency or eccentricity, but well-documented and authenticated cases are hard to find. There is no doubt that a milk-like substance can be expressed from the male breast in some cases of gynæcomastia.

In Creasy's (1912) case (a muscular Russian fireman of twenty-five) the patient's clothes were soaked with milk; a photograph of the case shows a large left breast with milk dripping from it. The patient was in the habit of manipulating and massaging the gland for some time before the symptoms started.

The interest of this is that it makes the alleged stories of male breast feeding more credible by showing that stimulation of the normal gland can produce a functioning gynæcomastia.

CLASSIFICATION OF CAUSES OF TRUE GYNÆCOMASTIA

(A) *Œstrogen excess*
- (1) "Mastitis of the newborn".
- (2) Stilbœstrol treatment.
- (3) Cirrhosis of the liver.
- (4) Tumours of the suprarenal cortex.
- (5) Tumours of the testicle.

(B) *Androgen lack*
- (1) Testicular atrophy.
- (2) Klinefelter, Reifenstein and Albright's syndrome.
- (3) Prepuberal castration.

(C) *Miscellaneous*
- (1) Mastitis of puberty.
- (2) Repeated trauma.
- (3) Prolonged starvation.
- (4) Amphetamine medication.
- (5) Methyl testosterone administration.
- (6) Idiopathic.

ŒSTROGEN EXCESS

The *mastitis of infants* is probably caused by œstrogenic or lactogenic hormones absorbed from their mothers' breast milk. Most commonly occurring about the tenth day of breast feeding, the condition is rarely troublesome. A few drops of milky fluid ("witches milk") can sometimes be expressed from the breasts.

Stilbœstrol treatment.—This is commonly given for carcinoma of the prostate. Tender enlargement of both breasts is a well-known complication of treatment. In the majority of cases it is not important, but severe cases occur which are distressing to the patient. The condition often improves spontaneously while stilbœstrol treatment is continued, but in persistent cases the dose has to be reduced. A slight but certain danger is that carcinoma can develop in male breasts enlarged by stilbœstrol treatment.

Cirrhosis of the liver.—More than 200 cases of gynæcomastia with cirrhosis of the liver are recorded in the literature. The liver is normally responsible for destroying œstrogens, so impairment of its function leads to an excess of œstrogenic substances, and hence to enlarged breasts.

Tumours of the suprarenal cortex.—Feminizing tumours of the suprarenal cortex are exceedingly rare; less than ten cases are recorded. Probably in these cases the suprarenal cortex produces an excess of œstrogens, although it is possible that a specific hormone—corticolactin—is responsible.

McFadzean (1946) recorded a striking case in which a large suprarenal tumour could be felt abdominally in a soldier who had marked gynæcomastia and one year's failing sexual function. Removal of the tumour led to a resumption of normal potency, although there was no immediate alteration in the size of the breasts.

In cases of cortical carcinoma there is a risk of metastases appearing after the removal of the tumour, as occurred in Simpson and Joll's (1938) case.

Tumours of the testicle.—Gilbert (1940) reviewed over a hundred cases of gynæcomastia associated with testicular neoplasms, the majority of which were choriogenic. He found evidence that by secretion of chorionic gonadotrophins these tumours had stimulated the pituitary to produce pseudo-pregnancy changes, and hence gynæcomastia.

ANDROGEN LACK

Testicular atrophy can occur after injury, or inflammation (especially mumps), or for no ascertainable cause. In some cases the lack of androgen results in gynæcomastia.

Klinefelter, Reifenstein and Albright's syndrome.—Klinefelter, Reifenstein and Albright (1942) described nine cases of gynæcomastia and aspermatogenesis with increased excretion of follicle-stimulating hormone. The testicles in these cases were small, but the authors found no evidence of androgen diminution, and considered the testicular defect was in the seminiferous tubules. Strictly speaking, their cases should not be included in the androgen lack group. They postulated that the seminiferous tubules normally secrete "inhibin" which *via* the pituitary prevents androgens from acting on male breasts, and they ascribed the gynæcomastia in their cases to lack of this inhibin.

Prepuberal castration.—Although true gynæcomastia in eunuchs is rare, Heller and Nelson (1945) record several cases. The mechanism may be purely androgen lack, but an alternative theory is that the adrenal glands in increasing their cortical activities to compensate for the lack of testicular hormones produce a ketosteroid with mammogenic activity.

MISCELLANEOUS CAUSES

Mastitis of puberty.—A firm, tender swelling behind the nipples is common in youths between the ages of thirteen and fifteen. The condition gives no trouble and disappears in a few months as puberty advances.

Repeated trauma.—Bailey and Love (1943) ascribe certain cases to aberrant braces secondary to a missing trouser button, and a high incidence in the Army has been attributed to the prolonged wearing of straps and packs. Habitual rubbing or manipulation (as already described in Creasy's case) may account for several, particularly unilateral, cases, in which the mere one-sidedness of the lesion makes it almost impossible to account for by any hormonal mechanism.

Prolonged starvation.—Gynæcomastia has been reported from several prison camps where starvation was common. These cases have to be rather vaguely attributed to hormonal imbalance secondary to malnutrition.

Amphetamine is given over long periods in certain depressive states, and psychiatrists have reported several cases from this cause, apparently due to an œstrogenic impurity in some preparations.

Methyl testosterone in large amounts can undoubtedly cause gynæcomastia; a particularly puzzling result to fit in with the current idea of raised œstrogen-androgen ratio. All that can be said is that "this happens, but one would not expect it to happen". The occasional occurrence of gynæcomastia after prostatectomy or with thyrotoxicosis is equally hard to explain except by dismissing it as fortuitous.

Idiopathic.—After all these classified causes there remains a moderate number

of idiopathic cases for which no satisfactory endocrine explanation can be found. Such cases usually show varying degrees of reduced testicular function.

TREATMENT

The treatment of gynæcomastia should ideally be the treatment of the cause, but so often the cause is unknown or untreatable. Nevertheless, in cases of testicular tumour, suprarenal tumour, prolonged trauma, starvation, or amphetamine addiction there is a treatable cause. The remaining cases, unless they are advanced, are best treated by reassurance and a placebo, such as a belladonna plaster. When the breasts are so enlarged as to be uncomfortable or unsightly, they are best removed surgically.

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ALOPECIA AREATA

ALOPECIA areata is a common disease and unfortunately one which can cause the greatest inconvenience to the patient and be a source of disappointment to the physician. Its etiology is unknown, and consequently there is no certain cure. Further, the prognosis is only assessable within the widest limits of probability.

CLINICAL DESCRIPTION

The earliest sign is a small, bald patch, in many instances first noted by the hairdresser. This increases in size at a varying speed, and by the time the patient presents at a clinic or consulting room it is usually two to three centimetres in diameter. The surface of the skin is shiny and not inflamed. The chief diagnostic characteristic is the presence of short, broken-off hairs, so-called "exclamation mark" hairs, which tend to be somewhat club-shaped, the thicker ends being distal to the scalp. These hairs are usually arranged round the periphery and are, in fact, the last vestiges of the dying hair. So long as they are present it will be found that hairs can be epilated manually with ease at the circumference of the bald area. When they cease to be found, the patch is usually in a state of quiescence and has reached its self-appointed limit, the hairs are firm, and in a space of weeks or months new hairs can be detected, growing as a rule in the centre. This progress is, however, very variable, and not infrequently regrowth takes place in the centre at the same time as the extension of falling hairs at the periphery.

At the other end of the scale is the fulminating and generalized alopecia areata, which involves all the hair on the body and where regrowth never takes place. Between these extremes lies a wide range of variations. Quite a high proportion of sufferers have multiple lesions, which naturally give rise to considerable alarm.

These may number up to half a dozen without being seriously disfiguring, so long as they do not tend to run together or assume any considerable size.

PROGNOSIS

This is naturally an all-important problem to the patient, who asks "Am I going to go bald?" Assessment of the likely spread and course of the disease can only be made on general probability. It is probably true to say that in about 80 per cent. of all cases the disease is limited to one to three patches and that regrowth is complete within a year. No reliable figure exists as to the proportion of cases which become total. It must, however, be very small, probably about 0.1 per cent. A favourable prognosis should therefore always be given, particularly on account of the possible underlying nervous factor. A prognostic sign of great importance is the falling out of the eyelashes and eyebrows. Such an occurrence by no means necessitates total alopecia, but it almost always implies multiple lesions and a history extending over a year.

Extension of alopecia to the beard area is a not uncommon occurrence, and it is occasionally seen by itself without bald patches on the scalp. It has no great prognostic importance. Falling out of the body hair practically only occurs when the hair has been completely shed from the scalp, when the case has therefore become a total alopecia. If the eyebrows are uninvolved, complete loss on the scalp can be followed by 100 per cent. regrowth, although the outlook is uncertain. If the eyebrows and eyelashes come out completely, the prognosis of regrowth is poor. There may be several attempts to regrow downy hair, and at times false hopes are raised in that it may attain the length of two or three inches. Disappointment is the usual rule, however, and the condition relapses. This state of affairs may exist for several years.

ETIOLOGY

At the beginning of the century, with the advent of increasing knowledge of ringworm infections, it was not surprising that alopecia areata was regarded as an infectious malady of this type. This was quickly disproven. Inquiry then ranged through the possibility of focal sepsis or some disturbance of the endocrino-sympathetic system as a causative agent.

A comparatively common background is some degree of psychological trauma, either a definite shock or a period of strain or anxiety, and it has usually been accepted that these are the most likely precipitating factors, although the mechanism by which this is transferred to the appearance of a circular area where the hair roots temporarily die is unexplained. There is a coexistent disturbance of pigmentation, as is evidenced by the new hairs often regrowing, in the first instance, white. It does not seem impossible and is, in fact, rather in keeping with the increasing knowledge of the subject, that the disease may turn out to be caused by a virus.

TREATMENT

Classical treatment for many years has been some form of local irritant applied to the bald patches. In view of the uncertain etiology, this has always seemed to be a procedure of doubtful merit. The efficacy of any treatment is notoriously difficult to assess, since spontaneous regrowth does usually occur. In a series of cases which were being treated by local irradiation by ultra-violet light, treating one half of the scalp and not the other did not show any calculable difference in the rate of

regrowth between the two sides. On the other hand, the experience of patients who get small and repeated attacks over years cannot be entirely disregarded, since they often state that a thorough blistering of the area by some means or other, in their experience, materially quickens regrowth.

Methods available which produce this effect can be chemical or physical. Most patients expect to rub something on, and a stock stimulating lotion exists in every pharmacopœia, usually containing ingredients such as glacial acetic acid, 3 minims (0.18 ml.), tincture of cantharides, 20 minims (1.2 ml.), chloral hydrate 10 grains (0.65 g.), all to the ounce (28.5 ml.). Physical methods include painting with CO_2 snow and acetone, ultra-violet light, and thorium-X varnish. Ultra-violet light is probably the most proven remedy and the one theoretically most desirable, since its application does have a known stimulating effect on the production of keratin and on the hair's regrowth. It can be most conveniently applied by means of a Kromayer lamp, when the degree of action can be controlled and accurately applied. In recent years thorium-X has had many advocates. It must be remembered, however, that its application over a long period can produce some degree of scarring and, in fact, permanent alopecia.

No specific general measure exists. Altering the patient's rhythm of existence, rest, and the administration of bromides and phenobarbitone are often justifiable in view of the probable psychosomatic background.

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NOTES AND QUERIES

Antihistamine Drugs in Infantile Dermatitis

QUERY.—I should be grateful if you could tell me whether or not the antihistamine drugs are considered of value in cases of infantile dermatitis characterized by inflamed, dry, scaly patches.

REPLY.—In the acute œdematous or exudative phases of eczema or dermatitis it is rational to use the antihistamine drugs because it is thought that the dilatation of the capillaries in the skin, accounting for exudation, is the result of liberation of histamine by damaged cells. Occasionally in the treatment of such conditions, the antihistamine preparations are temporarily very effective, but in many cases the results are disappointing. However, apart from the antihistamine action of these drugs, many of them exert a local anæsthetic effect and some act as narcotics, so that they may be used to allay irritation and even to induce sleep in patients with irritating dermatoses. One of the antihistamine creams might be tried as a local application in the treatment of inflamed, dry, scaly patches of dermatitis, or resolving eczema, but too much should not be expected of it. It can hardly be said that there is any urticarial background in a dry, scaly lesion, but the anæsthetic effect of the preparation might relieve the irritation and the emollient base would be a suitable dressing. Dermatologists would prefer probably to use Lassar's paste for the treatment of the lesion described, and sometimes equal parts of tar paste and a paste containing 3 per cent. of yellow oxide mercury, is better still when pyogenic infection is present.

R. T. BRAIN, M.D., F.R.C.P.

Lichen Simplex Chronicus of Vidal

QUERY.—I am interested in the condition called "lichen simplex chronicus of Vidal", mentioned in an article on "The Care of the Scalp and Hair", by Dr. Geoffrey Hodgson in the September 1949 issue of *The Practitioner*. I shall be most grateful if you can let me know the treatment for this condition. I have a patient who has so far failed to respond to a sulphur and salicylic acid lotion.

REPLY.—Lichen simplex chronicus of Vidal (neurodermatitis) commonly occurs as a circumscribed patch of raised lichenified skin on the nape of the neck (most commonly in

women), elbows, thighs, genital region or elsewhere. It may arise *de novo* or result from the habit scratching of an itching skin condition, such as a seborrhœic dermatitis. Individuals affected commonly show signs of nervous tension or fatigue. This may be due to overwork, periods of stress and emotional maladjustment. The scratch reflex which becomes conditioned often seems to "relieve the feelings" of such people, allowing a physical satisfaction of the nervous tension. Treatment attempts to break the scratch habit. Some voluntary control of the scratch habit is required, and readjustment of the circumstances underlying the nervous tension, with the administration of barbiturates or bromides. Superficial X-ray therapy, 150r once monthly, for four months, is mostly required to relieve itching. The patch may be painted with a tar solution: crude coal tar or tar dermament (Parke Davis & Co.). Tar ointments are also used: Solution of coal tar, 60 minims (3.6 ml.), zinc cream, 1 oz. (28.5 g.), or a proprietary tar ointment, especially for neurodermatitis on the scalp, Martindale's E.S.T.P. tar paste, or Genatosan colourless tar ointment. In areas where it is possible to do so, covering the area with adhesive plaster may serve to break the habit. The antihistamine agents in ointment form are said to relieve itching, but contact dermatitis may occur.

GEOFFREY HODGSON, M.B.E., D.M.

Chronic Maxillary Sinusitis

QUERY.—I shall be glad to have some advice about the following cases: I have two patients, aged seventy-six and thirty-nine, who are suffering from chronic maxillary sinusitis, confirmed radiologically. They both have constant colds, with frequent bilateral nasal obstruction, headaches, and bouts of pyrexia associated with exacerbation of symptoms. Treatment has consisted of ephedrine in saline nasal drops and in sprays in the subacute state, and penicillin injections in the acute phase, with temporary improvement. The older patient also had a sinus washout with no improvement whatsoever; indeed, it was followed by high pyrexia for several days. Both never feel really well and I am at a loss what to do with them.

REPLY.—It is presumed that these two patients are suffering from a chronic catarrhal suppuration of the maxillary sinus of nasal origin. The X-ray may show more than an opacity of the maxillary antrum. An opacity occurs after several attacks of sinusitis or after an antral operation. The suppuration and active disease may have resolved leaving a thickened antral wall. The diagnosis is obtained by a washout of the antrum. A specimen of a drop or two of pus exuding from the cannula is collected and sent for bacteriological examination. The character of the pus obtained from the washout is noted. Inoffensive muco-pus generally means a catarrhal sinusitis of nasal origin. Offensive, thick, dirty grey pus indicates an antritis of dental origin. If the antral suppuration does not improve after four to six washouts then a drainage operation is indicated.

Repeated attacks, headaches, and bouts of pyrexia are indications for operation, even at the age of seventy-six. Œdema of the middle turbinal and ethmoid, polypi, marked nasal obstructions, or an X-ray which shows that the ethmoid or other sinuses are involved, all make a drainage operation necessary. I have not known a satisfactory washout of the antrum to be the cause of pyrexia. If the organism cultured from the pus is sensitive to penicillin, intramuscular injections of 100,000 or more units can be given before and after operation. After operation it is necessary to treat the patient's general condition in the same way as for chronic bronchitis or even pulmonary tuberculosis, by careful hygiene, good food and good surroundings.

E. D. D. DAVIS, F.R.C.S.

Diphtheria Immunization

QUERY.—I shall be grateful for information on the following points:—(1) In the immunization of infants against diphtheria has it been proved that two injections, each of 0.5 ml. A.P.T., are more effective than 0.2 ml. followed by 0.5 ml.? (2) When a first injection of 0.5 ml. A.P.T. produces a severe general and local reaction in a child of one year, should immunization be completed with A.P.T., and, if so, in what dosage and at what interval? (3) Which prophylactic is recommended for the primary immunization of children of four, six, and eight years?

REPLY.—(1) Theoretically the larger injection (sensitizing dose) should be given before the smaller (immunizing) one, but the possibility that the patient has already been sensitized renders transposition of these doses advisable as a routine.

(2) If the first dose of 0.5 ml. has caused a severe reaction, the second dose should ordinarily be smaller, although repetition of the 0.5 ml. dose is generally safe enough in children; usually the reaction is smaller, rarely larger.

(3) T.A.F. is reserved for adults or highly reactive children, as A.P.T. is a more reliable prophylactic causing few reactions in the young. Holt's P.T.A.P. (Parke Davis & Co.) may in due course replace it (Bousfield, G., 1949, *Lancet*, **i**, 1100).

WILLIAM GUNN, M.B., F.R.C.P., D.P.H.

Penicillin in Ophthalmology

QUERY.—Professor Sorsby's article on "Penicillin in Ophthalmology" (*The Practitioner*, September 1949, **163**, 194) was read with great interest. I have an entirely Native practice in the North Eastern Transvaal, S. Africa. The nearest hospital is sixty miles away. The incidence of blindness is higher here than in any other area in this country. It is usually impossible to hospitalize patients with eye diseases. Would you kindly tell me if it is practicable to give subconjunctival injections in general practice, what special technique is applicable, and what local anæsthetic is recommended? I should also be interested to know if the use of penicillin is advocated for acute trachoma, and in what concentration? What other measures can be adopted in this disease when hospitalization is not possible?

REPLY.—There is no objection to subconjunctival injection of penicillin being given in general practice. The technique is simple.

The eye should be anæsthetized by instilling two drops of 4 per cent. solution of cocaine hydrochloride. The lids should then be shut and kept so for two minutes. This generally gives enough anæsthesia, but, if necessary, the procedure can be repeated. An eye speculum should then be inserted, or an assistant could hold the lids apart. A fold of conjunctiva, about 10 mm. away from the limbus, should be picked up with a pair of conjunctival fixation forceps. A subconjunctival injection should now be made with a fine needle and small syringe. A tuberculin syringe and needle are best. If unnecessary force is used the conjunctiva will tear, and most of the injected fluid escape. Likewise the fluid will escape if the needle is not entered properly into the subconjunctival space.

As regards the use of penicillin in acute trachoma, there is as yet insufficient clinical experience. For the present the most satisfactory method of treating trachoma would appear to be the following:—(a) Mechanical expression of trachoma follicles; (b) immediate painting with 30 per cent. sodium sulphacetamide solution, (c) a cold compress to alleviate the irritative effect of the expression; (d) daily painting with sodium sulphacetamide 30 per cent.; (e) twice daily use of sodium sulphacetamide ointment 6 per cent. If the state of the cornea necessitates it, atropine will have to be used in addition. It is essential to use non-irritating sodium sulphacetamide preparations. Those made by Schering are satisfactory.

The sulphonamides locally have a strictly limited use, and are of no value in infective conditions of the conjunctiva. They are not likely to be effective in trachoma if a secondary infection is present in addition to the trachoma. Such secondary infection must first be cleared up by the systemic use of sulphonamide, or by the local use of penicillin ointment. A fuller account of sulphonamide therapy is given in a paper in the *British Journal of Opthalmology*, 1945, **29**, 98.

ARNOLD SORSBY, M.D., F.R.C.S.

Acute Myeloid Leukæmia

QUERY (from Iraq).—A female patient, about thirty years of age and eight months pregnant, was brought to my notice on September 22, 1949, with a complaint of bloody diarrhœa and previous treatment with sulphathalidine. The patient was in a state of collapse, cyanosed with blue lips and nails, the pulse rate 120, blood pressure 98/70; the chest normal. Spleen and liver not enlarged. No lymph gland enlargement. No pathological findings in the central nervous system. No ulceration in the mouth.

Stool examination is + for *E. histolytica*.
Urine examination is normal and negative for albumin, pus and R.B.C
R.B.C. count is 4,250,000 with Hb 90 per cent.
W.B.C. count = 6,200, and differential count is:—

Myeloblasts	20	per cent.
Myelocytes	22	,,
Transitional neutrophils	27	,,
Polymorphs	5	,,
Eosinophils	0	,,
Lymphocytes	23	,,
Monocytes	3	,,

The number of platelets as seen in the slide seems to be normal. The patient gave birth to a dead baby a few hours later. On September 24, the cyanosis had improved much, and now treatment for the amœbic dysentery was begun with sulphathalidine, diodoquine and also intramuscular penicillin. Three days later, while still under the above treatment, she developed dry black ulceration of the skin, the ulceration surrounded by areas of erythema which preceded this black ulceration. The ulcerations were at the site of injection, also in the buttocks and front of the legs, and there were similar patches of erythema on the back. There was no ulceration of the mouth. The abdomen was tympanitic and the bloody diarrhœa persisted. There was also a typhoidal state. The above therapy was stopped, and aureomycin substituted. The patient died in the night of September 28.

(1) What is the pathology of the condition?

(2) Can the cyanosis and W.B.C. picture be attributable to the sulphathalidine?

(3) What is the cause of the black ulceration of skin and then death?

REPLY.—(1) This clinical picture first brings to mind the possibility of a fulminating and malignant form of septicæmia, such as septicæmic plague. However, such a diagnosis is eliminated immediately by the hæmatological findings. The blood count which is described can only have been caused by one condition, and that is acute myeloid leukæmia, of which these findings are typical; neutrophil polymorphonuclear leucocytes are scarce and 60 per cent. of the white cells are immature granulocytes. The writer of the query has apparently considered this diagnosis but rejected it on account of the absence of ulceration

n the mouth, which he has stressed. Although sual, this is not a constant feature in acute yeloid leukæmia, and likewise in such a ful- inating case there may be no obvious en- rgement of the spleen, liver, or lymph nodes n clinical examination. Again, at the first lood examination there may be no anæmia and o obvious reduction of the platelets in the ained film. Gastro-intestinal symptoms with emorrhage are not uncommon in this disease, nd I am inclined to regard the finding of *E. istolytica* in the stools as coincidental in this atient, who was resident in Iraq.

(2) Only extremely small amounts of sulpha- alidine are absorbed from the gastro-intestinal ract; thus sulphonamide reactions following its se are rare, and when they do occur they are ild. In the case in question, the cyanosis was n all probability due to myocardial weakness. s regards the white blood count, the changes hich on rare occasions may result from treat- ent with the more readily absorbed sul- honamides are very different from this; there s granulocytopenia or agranulocytosis.

(3) Patches of discoloration of the skin are mmon in acute myeloid leukæmia and are due o subcutaneous hæmorrhages. In fulminating ses these may progress to gangrene and ceration.

W. H. HARGREAVES, O.B.E., M.R.C.P., LT.-COL. R.A.M.C.

Pethidine Hydrochloride in Labour

UERY.—I shall be grateful for information on the use of pethidine hydrochloride (parenteral) in labour.

REPLY.—Pethidine hydrochloride is a synthetic analgesic which is suitable for use in the first stage of labour. Pethidine should not be given until labour is well established, and the uterine contractions are causing distress. It should always be given by the intramuscular route. The initial dose should be 100 to 150 mg., depending upon the nature of the labour. This may usefully be combined with the administration by mouth of chloral hydrate, especially if it is decided to ensure sleep. Pethidine may be repeated in doses of 100 mg. every three hours, but it is probably inadvisable to exceed a maximum dose of 300 mg. within twelve hours. Pethidine is not suitable for the later part of the first stage of labour. It is then advisable to proceed to gas and air, or gas and oxygen analgesia. Trilene analgesia may also be given, although there is some evidence from the report of the Royal College of Obstetricians and Gynæcologists that trilene, combined with pethidine, tends to produce fœtal asphyxia. Good results have also been claimed with the use of pethidine, 100 mg., with hyoscine, 1/150 of a grain (0.43 mg.). In this case pethidine may be repeated as required in doses of 100 mg. Toxic effects on the mother are rare, but the patient who has received either pethidine or hyoscine should be kept under careful observation.

JOSEPHINE BARNES, F.R.C.S., M.R.C.O.G.

PRACTICAL NOTES

ntravenous Procaine in Arthritis

THE intravenous infusion of procaine hydro- hloride for the management of pain in arthritic onditions is a safe procedure, provided the dministration is controlled", write D. J. esnubard and M. C. Peterson (*Journal of the merican Medical Association*, November 12, 949, **141**, 756) in a report on the results btained in a series of 250 patients. Procaine ydrochloride was given in dosage of 4 mg. per g. of body weight, administered in twenty inutes. An 0.1 per cent. solution of procaine ydrochloride in isotonic sodium chloride olution (1:1000) was tolerated by most patients; n hypertensive subjects 5 per cent. dextrose as substituted for the isotonic saline solution. The use of crystalline procaine hydrochloride hould be avoided as complete dissolution of the rug is uncertain. No premedication was given o the patients. Of 54 cases of rheumatoid rthritis, results were good in 39, fair in 9, and oor in 6; increased mobility was positive in 42. Of 42 cases of arthritis due to trauma, results were good in 40, fair in 1 and poor in 1; positive increased mobility in 41. Cases of degenerative diseases of the joints numbered 154; results were good in 120, fair in 20, and poor in 14. There was increased mobility in 128 cases. The number and frequency of infusions depended upon the degree or recurrence of pain: some patients received daily treatment, others weekly or on return of pain. In the three groups the average number of infusions was 9.8, 4.2 and 7.1 respectively. There was no evidence of sensitivity or addiction to procaine, nor was there any morbidity or mortality. In conclusion the authors state: "The results obtained . . . indicate that this method is a satisfactory adjuvant in the management of arthritis".

Carcinoma of the Lung

A STEADY increase in the incidence of carcinoma of the lung in the Liverpool region is shown by

the number of cases recorded in the Clinical and Pathological Register of the Liverpool Cancer Control Organization during the period 1944-48: total number of cases recorded, 1,610; and whereas in 1944 the number of cases was 210, in 1948 the figure was 456. J. S. Fulton (*Proceedings of the Royal Society of Medicine*, October 1949, **42**, 775), discussing the increased incidence, states that two factors must be taken into consideration in order to obtain a true perspective: (1) the increase in the population served by the Liverpool Centre, and (2) the increasing interest of hospitals in recording cases of malignant disease with the Registry; nevertheless, the incidence of carcinoma of the lung in the Liverpool region was in excess of 200 new cases per year per million of population.

Year	Population served	Cases registered	Registrations per million
1944 ..	1,440,000	210	145
1945 ..	1,500,000	245	163
1946 ..	1,630,000	321	197
1947 ..	1,900,000	378	199
1948 ..	2,200,000	456	207

The age-groups 40-69 show the highest incidence, the highest (570) being in the 50-59 age-group. There was a much higher incidence among males than among females: of the total 1,600 cases, 1,416 were male and 194 females. Little difference is evident between the figures for indoor and outdoor occupations: of the outdoor group, labourers and transport workers show the highest figures (192 and 109 respectively); chemical and metal workers accounted for 118 cases, among these being painters (27) and furnacemen (30). Among the indoor occupations housewives totalled 147 cases. Whether or not tobacco is an etiological factor is the subject of an investigation in hand, but the author states that meanwhile the evidence to date indicates that it may be an etiological factor of statistical significance. Of the 1,610 cases recorded, 1,392 proved fatal, 1,378 dying of malignancy and 14 of intercurrent disease. Of the 1,378 patients who died of malignancy, 915 were untreated. The following table gives the periods of survival from the onset of symptoms:—

	Number		Average survival (months)
Untreated cases		915	7·6
Treated cases:			
Nitrogen mustard	12		5·5
Palliative surgery (exploratory)	37		9·4
Palliative X-ray	199		9·0
Radical surgery	25		11·5
Radical X-ray	190		14·7
		463	
		1,378	

"Radical surgical removal of a tumour, when practicable, is the method of choice", says the author, but when the chances are seriously in doubt the surgeon should refrain from opening the chest, and effective radiotherapy should not be delayed. A unit is being developed in Liverpool in which radiotherapeutic measures may be employed through the open chest at the time of operation in cases in which radical removal proves impracticable.

Treatment of Ingrown Toe Nail

A SIMPLE method for the treatment of ingrown toe nail which, it is stated, was first employed on troops aboard ship during manœuvres in preparation for the invasion of Sicily, is described by R. W. Newman (*Surgery, Gynecology and Obstetrics*, November 1949, **89**, 638). The method, the object of which is to re-establish and maintain the nail sulcus and so provide the nail with an open channel along which its growth may proceed unobstructed, comprises an incision through the soft tissues under

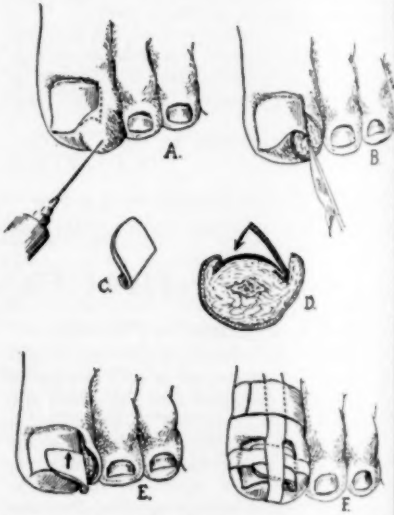

FIG. 1.—A, novocain injected under pressure. B, incision of swollen, overgrown soft tissue along line of nail sulcus exposing ingrown portion of nail. C, nail plate made of light weight stainless steel. D, cross-sectional view of E. E, nail plate being put in place. F, operation completed with plate and tape properly placed. Note the relative size of plate and nail. The 60 degree angled corner of this plate projects beyond the soft tissue of the sulcus.

novocain anæsthesia, and the application of a small, light-weight stainless steel plate with under-turned edge. Any extensive inflammation should be cleared up with hot soaks before operation, but in the presence of chronic or localized infection operation can be carried out

thout hesitancy as the plate provides adequate rainage. The method is as follows:—

After cleansing the toe with soap and water, alcohol d an antiseptic, a small quantity of novocain is injected ectly into the swollen tissue over the tip of the ingrown rtion of the toe nail (fig. A). The injection is made idly and under sufficient pressure to provide immediate esthesia and absolute hæmostasis. An incision is then ade through the overgrown tissue in line with, and out the depth of, the nail sulcus, thus revealing the eral margin of the ingrown tip of the nail (fig. B). The al plate (fig. C) is now put in place "by first engaging e narrow, underturned margin beneath the ingrown tip the nail and then gently forcing the plate proximally on e nail" (fig. D and E), the distal end of the plate being owed to project beyond the soft tissue at the site of ision (fig. E). Narrow pieces of adhesive strapping are en applied to hold the plate in place (fig. F). It is im-rtant that the adhesive plaster be only *laid on*, to avoid y undue pressure on the swollen tissue. Sterile gauze is en applied and secured with a narrow bandage and esive tape.

Weight-bearing may be allowed immediately, though as a rule the toe is sore for two or ree days; if soreness persists the plate should e carefully inspected. The outer gauze dressing changed on the third day, the toe cleaned, and small piece of sterile gauze applied. The rapping holding the plate in place should not e disturbed; if loosened, fresh strapping is plied over it. The patient is then told to keep e toe clean and change the outer gauze ssing only when required. The plate should e kept in place until the nail has grown out to e distal end of the sulcus; however, it may be moved after three weeks and replaced without in. Once the nail has grown to the desired gth the patient should be instructed to keep cut straight across and not to trim it proxi-ally in the sulcus, or there may be recurrence the trouble.

ntihistamine Drugs in Nausea and omiting of Pregnancy

f 1,816 patients seen at the antenatal clinic of e Public Health Department, County Borough Smethwick, between January 1948 and March 49, 899 complained of nausea and vomiting, of whom were treated with antihistamine gs. The results are recorded by T. Dougray *itish Medical Journal*, November 12, 1949, 1081). The drugs employed were, first nthisan", and later "phenergan". The dosage anthisan was one tablet of 0.1 g. morning and ening, gradually increased to five or six times ily. Most of the cases in which symptoms were t relieved completely occurred in the early rt of the investigation when smaller doses were ployed, which suggested the use of a stronger tihistamine drug. Phenergan was then em-yed: one tablet of 0.025 g. thrice daily oved sufficient to relieve symptoms in most es, although some required heavier dosage, d in one case seven tablets daily were given. is stated that "the efficacy of the drug is dependent on the dosage employed, and its effect seems to be cumulative". The chief side-effect of both drugs was drowsiness, and when this was severe amphetamine sulphate, 5 mg., proved effective. Of the 94 cases treated, cure was obtained in 78 (83 per cent.), improvement in 4 (4 per cent.), and failure in 12 (13 per cent.). The nausea and vomiting were usually relieved within two or three days of starting the drug, but treatment was continued for several weeks to avoid relapse: in most cases a treatment period of three to four weeks proved sufficient. It is pointed out that spontaneous relief of symptoms occurs as a rule at the end of the first trimester, and most patients await this outcome. When treatment is necessary, recourse to simple dietary measures usually brings relief, but in many cases the symptoms persist and may constitute a potential danger. In this event there is need for a simple and safe method of treatment, and "the results of the investigation into the use of anthisan and phenergan in this condition suggest that the antihistamine drugs may offer just such a form of therapy".

Cardiovascular Lesions in Apoplexy

THE following findings are based upon a clinical and post-mortem examination of 155 patients who died from apoplexy (S. P. Hicks and B. K. Black, *American Heart Journal*, October 1949, **38,** 528). The cerebral lesions in these cases were: hæmorrhage in 118, infarction with thrombosis in 12, infarction without thrombosis in 11, and ruptured aneurysm in 14 cases. Among the 118 cases of hæmorrhage the cardiovascular findings were: hypertension in 89 per cent., coronary sclerosis and/or cardiac hypertrophy in 82 per cent., congestive heart failure in 13 per cent., and marked cerebral arteriosclerosis in 17 per cent. In the 14 cases of ruptured aneurysm, hypertension was present in 8, coronary sclerosis and/or cardiac hypertrophy in 7, and marked cerebral arteriosclerosis in 3 cases. It is concluded that "functional cerebrovascular disease (probably spasm) appeared to be the important factor in most cases, while systemic circulatory failure accounted directly for very few cerebral accidents". It is suggested that arterial spasm "produces anoxic damage to the vulnerable deep vessels, diapedesis, and coalescence of the hæmorrhages".

Osteomyelitis Following Intra-Osseous Infusions

TWO cases of osteomyelitis following bone marrow infusions in infants are reported by E. C. Texter, W. A. Irwin and D. H. Kaump (*American Journal of Rœntgenology*, October 1949, **62,** 534). One was a female infant aged

nineteen days, with pyloric stenosis, who was given 3,580 ml. of various solutions into the tibia; these solutions included 5 per cent. dextrose in distilled water or in normal saline, whole blood, plasma, and 5 per cent. amigen. The second was a female infant aged two months, with diarrhœa, who was given into the right tibia, by continuous infusion, 500 ml. of glucose in saline, 500 ml. of 10 per cent. glucose in distilled water, 100 ml. of parenamine, and 100,000 units of penicillin. In both cases the osteomyelitis responded to penicillin. These were the only cases of osteomyelitis which occurred in a series of 383 intra-osseous infusions. It is stated that 19 other cases are recorded in the literature. In reviewing these 21 cases the opinion is expressed that in two cases such infusions should not have been given, as in one the infusion was made through severely burned skin and in the other there was septicæmia with multiple abscesses. Ten of the sixteen cases with complete data were associated with the use of continuous infusions. In four cases the infection developed following the use of hypertonic solutions. "The overall risk of osteomyelitis is low (0.41 per cent.) unless hypertonic solutions or continuous infusion is used, when the risk becomes much greater (6-13 per cent.). Intra-osseous infusions are further contraindicated in the presence of severe skin or generalized blood-stream infections".

Penicillin in Actinomycosis

As a result of his experience with 12 cases of cervicofacial actinomycosis caused by *Actinomycetes bovis*, O. Gottlieb (*Nordisk Medicin*, November 18, 1949, **42**, 1807) concludes that "the former treatment of cervicofacial actinomycosis (X-ray and surgical drainage) yields excellent results, nearly all the patients recovering after a short or long period. But penicillin treatment on the lines suggested may be regarded as equally safe and much quicker, the average duration of treatment being 21 days". Acute cases were treated by surgical intervention supplemented by 100,000 units of penicillin intramuscularly thrice daily for about a week. In the case of chronic and subacute cases, 300,000 units of penicillin intramuscularly thrice daily were required for an average of two weeks; an alternative form of treatment for these cases was local infiltration daily with 200,000 units of procaine penicillin in water. No organisms could be found on culture of the pus after one or two days' treatment with penicillin. No recurrences were seen in any of the cases during a follow-up period of two to twelve months. "Penicillin was found to have no effect on the actinomycetes in dental foci. These were removed by extraction, no subsequent exacerbation of the infection being perceptible".

Para-Aminosalicylic Acid as Aerosol in Respiratory Tuberculosis

TEN cases of pulmonary tuberculosis have been treated with *p*-aminosalicylic acid as an aerosol in conjunction with oral therapy (A. E. Salvi, *Tubercle*, October 1949, **30**, 223). Except in one case in which oral P.A.S. therapy alone (140 g. weekly) had been given for three months the method of administration was as follows:— "10 g. by mouth in five four-hourly doses daily for six days, followed by a rest day; in the form of a 25 per cent. solution in distilled water diluted with . . . flavouring agents . . . at time of administration, and two applications of aerosol daily, without any rest day, 1 ml. of 20 per cent. P.A.S. in distilled water for each application, the duration of which is six minutes at every attendance". Of the 10 cases treated, 8 have been under observation for three months or longer, and in 4 of these closure of the cavity has occurred; of the other 2, one is progressing and one has shown some honey-combing. All are sputum negative. Two further cases are still under treatment (one month), and two failed. Five cases of tuberculosis of the mouth and larynx are also recorded, and in three satisfactory results were obtained. One disadvantage of the treatment is that P.A.S. in solution, both as administered and as secreted in the urine, stains linen, and so far no means have been found to remove such stains. This applies to staff uniforms as well as to patients' clothing. The advantages are: (1) in the dosage employed no subjective or objective reactions to the drug occurred; (2) it was found possible to treat in all grades of activity, from bed rest upwards. It is stated that "of the cases treated by local application, the healing of the ulcerated mouth was most gratifying".

Sodium Bicarbonate Treatment of Postoperative Hiccup

ACCORDING to M. Wenzl (*Wiener klinische Wochenschrift*, September 16, 1949, **61**, 600) acidosis is a frequent etiological factor in postoperative hiccup. This was demonstrated in six patients, all of whom responded rapidly to large doses of sodium bicarbonate given by mouth or intravenously. In one patient, who had been hiccupping for six days, the dose was six coffee spoons (18 g.) sodium bicarbonate in water in the course of two hours, repeated the following day. For intravenous administration 300 ml. of 2½ per cent. sterile solution of sodium bicarbonate *per diem* may be given.

REVIEWS OF BOOKS

...-ray Diagnosis: For Clinical Students and Practitioners. By G. Simon, M.D., B.Ch., F.F.R. Cambridge: Heffer & Sons Ltd., 1949. Pp. x and 207. Figures 180. Price 20*s*.

...e author of this book sticks closely to the ...quirements of practitioners and students, who ...e his proposed readers, and the more carefully ...s read the more it will be realized how well ...e has succeeded. He gives a simple explanation ...f the principles that underlie the production of ...good skiagram and states clearly the prepara... ...n of the patient and the materials that are ...ed for special techniques. The selection and ...production of the skiagrams are good, and ...ey really do illustrate the points that are being ...ade. Those engaged in more specialized work ...ay consider that much is omitted and some ...aterial is treated too briefly to be of value, but ...e book gives a balanced view of radiology in ...agnosis and the control of treatment, and it ...ill remind the clinician that only by close ...operation with the radiologist will he get the ...st help. This book will be a sound and cheap ...vestment for those practitioners and students ...ho acquire it.

...e Diagnosis and Treatment of Adrenal Insufficiency. By George W. Thorn, M.D., with the collaboration of Peter H. Forsham, M.D., and Kendall Emerson, Jun., M.D. Oxford: Blackwell Scientific Publications; Springfield, Illinois: Charles C Thomas, 1949. Pp. vii and 171. Figures 32. Price 40*s*.

...is admirable little book represents the sum ...the authors' unique experience with a group ...158 patients with Addison's disease. The in...rmation given is the result of work in the ...nic and a considerable amount of laboratory ...search conducted by the senior author and ...s collaborators at Johns Hopkins Hospital ...d the Peter Bent Brigham Hospital, Boston. ...e contents are comprehensive and well set out ...that the management of these difficult cases ...y be confidently undertaken in the light of ...e authors' advice. There is adequate discussion ...the pathological physiology of the condition, ...t in spite of this it is a little disappointing that ...e question of pathological pigmentation has ...t received more attention. Nevertheless, it is ...nted out that lesions about the cœliac axis are ...ble to be associated with this feature. The ...dition of an index would be helpful for pur...es of reference and could be expected for the ...her heavy cost entailed in its purchase.

Modern Practice in Ophthalmology. Edited by H. B. Stallard, M.B.E., M.D., F.R.C.S. London: Butterworth & Co. (Publishers), Ltd., 1949. Pp. xix and 525. Figures 231. Price 65*s*.

This book is intended for the use of the general practitioner, as a help in the conduct of cases of eye disease, when he has the specialist's aid, and also when this is not readily available. For the sake of lucidity with so much material, much of the information is necessarily set down in very deliberate form. Doggart, in discussing inflammation in his chapters on cornea and uvea, indicates also what should be the clinician's attitude in tackling his case; a method which makes reading more interesting. The chapter on squint, on the other hand, does not show with any fullness what the objects of orthoptic treatment are, yet the general practitioner, wishing to interest himself in eyes, would probably like to ask questions about it. The chapters on refraction, squint, operations, and medical ophthalmology, are the longest. Production is similar to the same publishers' "Modern Trends", making the book pleasant to handle, as well as informative to read.

The Portraiture of William Harvey. By Geoffrey Keynes, M.D., F.R.C.S. London: The Royal College of Surgeons of England, 1949. Pp. 42. Plates 32. Price 15*s*.

The author of this work of art, which constituted the Thomas Vicary Lecture delivered at the Royal College of Surgeons in November 1948, has for long been recognized as being in the true tradition of the great surgeon-scholars. This beautifully produced book will undoubtedly rank as one of the classics of medical history, and is an outstanding contribution to Harveian literature. The lecture is devoted to a critical discussion of all the known, and claimed, portraits of William Harvey, with a view to deciding which are genuine. The conclusion is that there are only three which represent Harvey as he was: the portrait in the Royal College of Physicians, the Hunterian one in Glasgow, and the bust in Hempstead (Essex) Church. Another three are of "great interest". "All others are posthumous productions, modern forgeries or representations of other people".

As an example of critical analysis of a mass of contradictory data the book makes fascinating reading. Many sources hitherto ignored by Harveian scholars have been unearthed and carefully investigated, and although the evidence

is occasionally thin, the author makes out a good case for his conclusions. The value of the book is greatly enhanced by the series of masterly reproductions of the various portraits examined; these are a joy to study, and for these alone the book is worth possessing.

A Twentieth Century Physician. Being the Reminiscences of SIR ARTHUR HURST, D.M., F.R.C.P. Foreword by PROFESSOR JOHN A. RYLE, M.D. F.R.C.P. London: Edward Arnold & Co., 1949. Pp. viii and 200. Plates 12. Price 15*s.*

THIS book consists of Arthur Hurst's personal reminiscences which he was engaged in writing at the time of his death. For the purposes of this "life" little has been done to these in the way of editing. This is not fair to the memory of one of the greatest clinicians of his times, as the reminiscences are obviously incomplete and lack that finish and polish which were always such marked characteristics of Hurst's scientific publications. Many readers will share the reviewer's regret that more time was not spent on this life so as to ensure that it was a really complete picture of the man. In spite of these criticisms the book will be read with interest by all who knew Hurst. Outstandingly brilliant are his pen-portraits of his seniors, colleagues and juniors at Oxford and Guy's. One of the most kind-hearted and understanding of men, Hurst had a mordant streak which never allowed him to suffer fools gladly, and pretentiousness and affectation made him rise to heights of sarcasm which were a joy to his many friends. His description of the President of Magdalen in his time is a typical example. It includes the story of the young Indian who wished to become an undergraduate at New College, and was introduced to Dean Spooner, the Warden. "On being told that his friends regarded him as the incarnation of the Deity, Spooner replied, 'I think he would be happier at Magdalen. I should see the President, Sir Herbert Warren'." Perhaps his former colleague who writes the foreword for this volume will one day be able to find the time to write a biography worthy of one who was a pioneer in bridging the gulf between the old and the new type of physician.

NEW EDITIONS

THOROUGH revision of the text of *Illustrations of Surgical Treatment, Instruments and Appliances*, by Eric L. Farquharson, M.D., F.R.C.S., F.R.C.S.ED., in its third edition (E. & S. Livingstone Ltd., 25*s.*) has been carried out to permit incorporation of recent advances and some new illustrations. As this work has been out of print for many months the new edition will be assured of a warm welcome.

Introduction to Clinical Surgery, by Char F. M. Saint, C.B.E., M.D., M.S., F.R.C.S., in second edition (Juton & Co. Ltd., Capetow H. K. Lewis & Co., Ltd., 45*s.*, has been revi and a number of illustrations added. The auth who was formerly Professor of Surgery at University of Cape Town, bases his clini findings on a vast experience, and not only advanced student, but practitioners also find this work of practical help in diagno

First Aid Manual No. 1, by Sir Harold Whittingham, K.C.B., K.B.E., F.R.C.P., and Stanford Cade, K.B.E., C.B., F.R.C.S., in ninth edition (Macmillan & Co., Ltd., 3 Ten years have elapsed since the appearance the previous edition of the British Red Cr Society's First Aid Manual No. 1, and th most of the book has been re-written. Th new chapters — miscellaneous emergenci action at the incident, and first aid in C Defence—have been added.

IN the preparation of the eighth edition *Massage and Remedial Exercises*, by Noël Tidy (John Wright & Sons Ltd., 25*s.*) material has been added to the chapters respiratory diseases, abdominal and pelvic c ditions, and the after-effects of injury. Revis of the section on anterior poliomyelitis has b carried out, and in the chapter on lesions of peripheral nerves a section on the treatment sciatica due to prolapsed intervertebral disc physical methods has been included.

A NEW section on the antibiotics, and revis and extension of the sections on emulsio sterilization, and injection solutions are featu of the fourth edition of *Aids to Dispens* revised by G. M. Watson, B.PHARM., PH and E. J. M. Feeney, M.P.S. (Baillière, Tin & Cox, 5*s.*). Alterations in accordance with new British Pharmacopœia have also b incorporated.

NOTES AND PREPARATIONS

BEGINNING with this issue, the section entit "Notes and Preparations" will be found mediately following the last page of text (in number see p. lxix). This change has b made in order to allow more space to devoted to this section.

INDEX AND BINDING CASES

The index to Vol. 163 (July-December, 1949) wi forwarded to all subscribers with this issue. Bin cases for this and previous volumes are available in cloth with gilt lettering, price 4*s.* each, post free. cases are made to hold six copies after the advertise pages have been removed; they are not self-bin Alternatively, subscribers' copies can be bound inclusive charge of 10*s.* 6*d.* per volume; this include cost of the binding case and return postage.

The contents of the February issue, which will co a symposium on "Neurology", will be found on lxxxii at the end of the advertisement section.